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Eleven new South African earthworms (Oligochaeta: Microchaetidae) with new information on some known species, and an inventory of the microchaetids of KwaZulu-Natal

by

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ABSTRACT

Eleven new South African indigenous earthworm species in three genera of Microchaetidae are described and illustrated: *Microchaetus distasmosus*, *idechoritus*, *quaerus*; *Proandricus adami*, *amphius*, *oresbiosus* (assigned to the *lesothoensis* species-group), *lovuus* (assigned to the *belli* species-group); *Tritogenia debbieae*, *hiltonia*, *qudeni* (assigned to the *sulcata* species-group); for the fourth new species, *tetrata*, a new species-group is proposed.

Of 137 currently known microchaetid species 77 are known from KwaZulu-Natal (KZN): 15 *Microchaetus*, 30 *Proandricus*, 31 *Tritogenia*, and one *Michalakus*. The exceptional diversity and endemicity of microchaetid species in this province is noted. Attention is drawn to the threat of extinction of several indigenous species. Species distribution in KZN is mapped. New localities are recorded for *Microchaetus*: *natalensis*, *parvus*, *pondoanus*, *tuberosus*; *Proandricus*: *bourquini*, *beddardi*, *setosus*, *adriani*, *babanango*, *bergvillensis*, *entumeni*, *gracilis*, *jasoni*, *ortyi*, *thornvillensis*; *Tritogenia*: *grisea*, *kruegeri*, *ngomensis*, *douglasi*, *herbana*, *howickiana*, *karkloofia*, *lunata*, *shawi*, *sulcata*, *alveata;* and *Michalakus initus*. New taxonomic or distributional information on certain species is added.

INTRODUCTION

The objectives of this paper are: first, to describe eleven new species in three genera of Microchaetidae: three species in *Microchaetus* (*distasmosus*, *idechoritus*, *quaerus*); four in *Proandricus* (*adami*, *amphius*, *oresbiosus* and *lovuus*); four in *Tritogenia* (*debbieae*, *hiltonia*, *qudeni and tetrata*); secondly, to present an annotated inventory of the microchaetid taxa known to occur in KZN, with indication on their indigenous status; and thirdly, to add new taxonomical or distributional information for selected species.

As a result of my intensive collecting and study of earthworms in KZN during the past 15 years, and examining new material recently collected in protected areas of this province by Dr A. J. Armstrong from the Biodiversity Division, KZN Wildlife, a large and diverse fauna has been revealed. It is now known than at least 77 species in four genera—*Microchaetus* (15), *Proandricus* (30), *Tritogenia* (31) and *Michalakus* (1)—occur in this province (Kinberg 1867, Rosa 1891, Benham 1886*a b* 1892, Beddard 1907, Michaelsen 1907 1913*a b c* 1928, Plisko & Zicsi 1991, Zicsi & Pajor 1992, Plisko 1991 1992 1993*a b* 1995*a b* 1996*a b* 1997 1998 2000*a b* 2002*a b*). This is nearly 57% of the total number of South African microchaetid species described to date (Tables 1–3). Of these 77 species, 69 appear to be endemic to KZN. In addition, the province has a significant, though poorly documented fauna of indigenous Acanthodrilidae, and a considerable number of allochthonous, introduced earthworm species which sometimes occur in dense populations. The high level of such provincial endemism of megadrile earthworms, something that is usually associated with the limited distribution of individual species, raises concern about their conservation status. To facilitate an understanding of the conservation needs of these characteristic and important members of the soil fauna, an annotated inventory of all the microchaetid species recorded in KZN is given.

MATERIAL AND METHODS

Type material and other studied specimens are housed in the Natal Museum. Descriptions are based on specimens preserved in alcohol or formalin. Internal anatomy was observed after conducting a dorsal incision longitudinally. Morphological and anatomical terminology referring to species assigned to *Microchaetus* and *Michalakus* follows previous publications (Plisko 1992 1993*b* 1996*a* 1998 2002*b*). Proandric species and their assignment to species-groups in *Proandricus* follow earlier publications (Plisko 1993*a* 1994 1996*b* 2000*b* 2002*a*). Three new species of *Tritogenia—debbieae, hiltonia* and *qudeni*—are assigned to the earlier proposed *sulcata* species-group (Plisko 1997). For the fourth new species, *T. tetrata*, a new *tetrata* species-group is proposed. The keys for earlier known microchaetid species can be consulted in my earlier publications (Plisko 1997 1998 2000*b*). Species previously recorded from KZN, not examined in the present study, are also listed and various remarks are added. Each map showing the collection sites in KZN has in its corner a map of South Africa, with the present names of the provinces. Collection sites of species *Microchaetus* and *Michalakus* are combined in one map (Fig. 1). Separate maps are presented for species of *Proandricus* and *Tritogenia* (Figs 7, 14 respectively). Co-ordinates provided in brackets refer to place names, or to the localities recorded on the original labels. Photographs of all new species of *Microchaetus* (Figs 2–6), *Proandricus* (Figs 8–13), *Tritogenia debbieae* (Fig. 15) and *Tritogenia qudeni* (Fig. 17) were taken using a Wild photomicroscope. *Tritogenia hiltonia* and *Tritogenia tetrata* were scanned using a high-resolution flatbed scanner (Figs 16, 18).

Abbreviations:

AJA	A. J. Armstrong
BK	B. Kasseepursad
BRS	B. R. Stuckenberg
cl	clitellate
DG	D. Gwala
DMc	D. McCulley
HM	H. Murray
JDP	J. D. Plisko
juv	juvenile
KZN	KwaZulu-Natal
NMSA	Natal Museum, Pietermaritzburg, South Africa
NMSA/Olig.	Oligochaeta Collection in Natal Museum
OB	O. Bourquin
PN	P. Ngwenya
SA	Republic of South Africa
TCD	T. C. Dlamini
TL	T. Liversage
TN	T. Ndlovu
ZMH	Zoologisches Museum und Institut in Hamburg, Germany

TAXONOMY

Microchaetus Rapp, 1849

Microchaetus Rapp, 1849: 142.

Type species _Lumbricus microchaetus_ Rapp, 1849 by monotypy. Type depository: Natural History Museum in Vienna.

Forty nine species recorded from SA and Swaziland (Table 1); 15 known from KZN, 12 being endemic.

Species distribution in KZN is shown in Fig. 1.

Forty eight holandric and one metandric, with one oesophageal gizzard in segment 7, and one pair of nephridia per segment.

Three new species, _distasmosus_, _idechoritus_ and _quaerus_, are described below. For the species earlier recorded from KZN, _natalensis_, _parvus_, _pondoanus_ and _tuberosus_, new collection data are provided. For _benhami_, _caementerii_, _papillatus_ and _vernoni_, notes are given. For species: _ambitus_ Plisko, 1998, _griphus_ Plisko, 2002, _herberti_ Plisko, 2002, _mkuzi_ Plisko, 1992 and _zaloumisi_ Plisko, 1992, not examined in this paper, earlier known collection sites are mapped (Fig. 1).

TABLE 1

The distribution of _Microchaetus_ species.
Species marked with one asterisk are endemic to KwaZulu-Natal; those marked with two asterisks occur in KZN but have broader distributions as indicated. Those with no asterisk have not been recorded from KZN but occur in the provinces indicated.

alipentus = Western Cape
_ambitus_*
benhami = Eastern Cape
braunsi = Eastern Cape
_caementerii_*
circulatus = Northern Cape
crousi = Western Cape
davidi = Northern Cape
decipiens = Eastern Cape
_distasmosus_*
franciscus = Western Cape
_griphus_*
guntheri =Western Cape
hamerae = Western Cape
_herberti_*
_idechoritus_*
imitatus = Western Cape
klopperi = Eastern Cape
ljungströmi = Western Cape
madidus = Eastern Cape
metandrus = Western Cape
microchaetus = Eastern Cape
_mkuzi_*
montanus = Eastern Cape
namaensis = Western Cape
natalensis** = SA: Mpumalanga, Limpopo; SWAZILAND
obscurus = Western Cape
occidualis = Western Cape
occiduus = Western Cape
_papillatus_*
parvus** = Mpumalanga
pauli = Western Cape
pearsonianus = Western Cape
pentheri = Eastern Cape
pentus = Western Cape
peringueyi = Western Cape
pondoanus** = Eastern Cape
_quaerus_*
rappi = Eastern Cape
ritae = Eastern Cape
rivus = Eastern Cape
rosai = Western Cape
sandersi = Eastern Cape
senarius = Western Cape
sophiae = Western Cape
stuckenbergi = Eastern Cape
_tuberosus_*
_vernoni_*
_zaloumisi_*

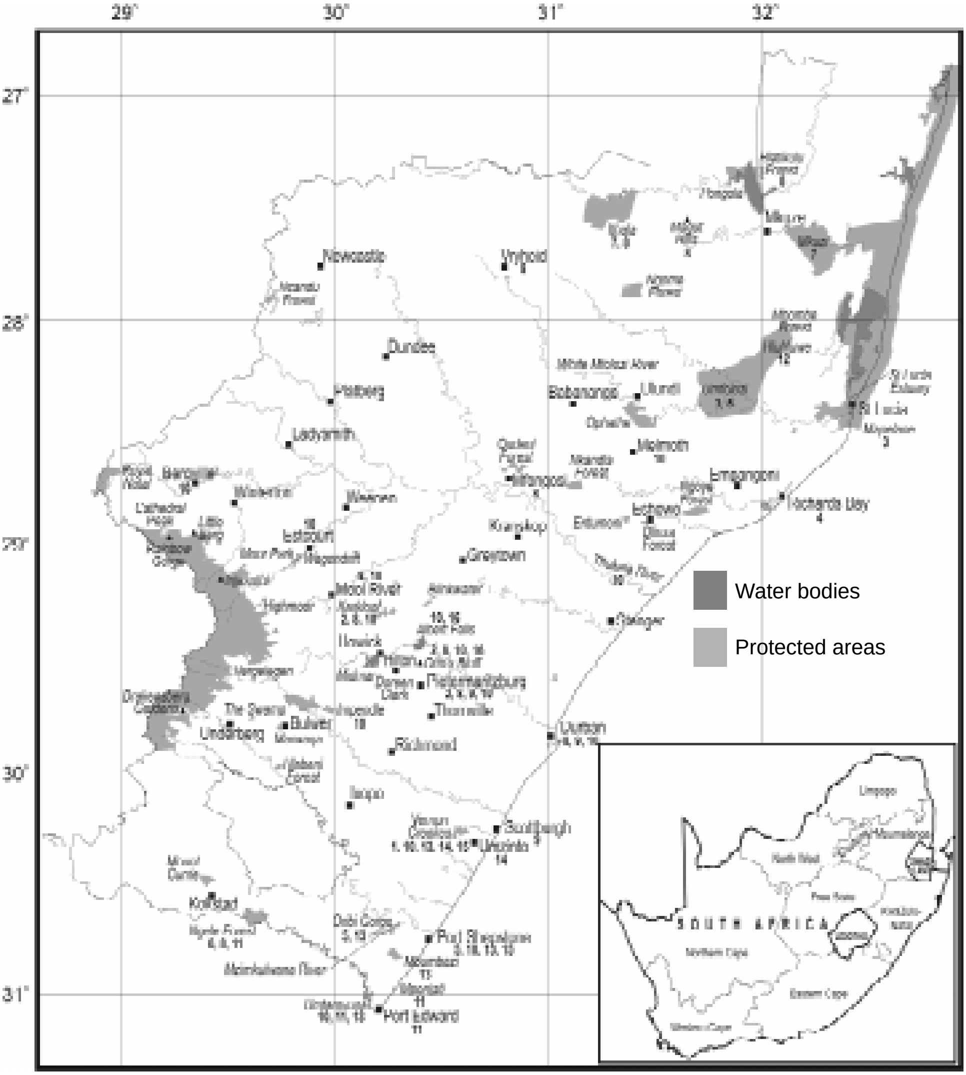


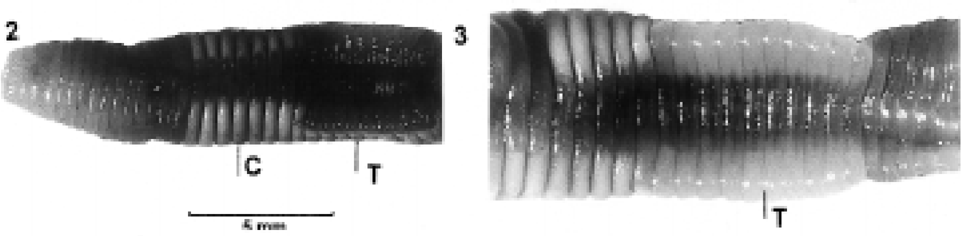
Fig. 1. The distribution of species of *Microchaetus* and *Michalakus* in KZN. *Microchaetus*: 1 = *ambitus*; 2 = *caementerii*; 3 = *distasmosus*; 4 = *griphus*; 5 = *herberti*; 6 = *idechoritus*; 7 = *mkuzi*; 8 = *natalensis*; 9 = *papillatus*; 10 = *parvus*; 11 = *pondoanus*; 12 = *quaerus*; 13 = *tuberosus*; 14 = *vernoni*; 15 = *zaloumisi*; 16 = *Michalakus initus*.

Microchaetus distasmosus sp.n.

(Figs 2–3)

Etymology: G. *distasmos* = uncertainty. Refers to the unusual combination of internal characters observed in this species.

Material examined: **KwaZulu-Natal**: Holotype NMSA/Olig.02532 Mapelane Nature Reserve (28º54'S:31º55'E) at the edge of forest and grassland, from moist, sandy soil, 26 November 1996, JDP, TL. Paratypes: NMSA/Olig.02377, 6 not fully mature, with



Figs 2–3. *Microchaetus distasmosus* sp. n. 2. Holotype, anterior part of body, ventral view with clitellum and tubercula pubertatis. 3. Paratype, clitellar region, enlarged. [C = clitellum, T = tuberculum pubertatis].

tubercula pubertatis, collected together with holotype; NMSA/Olig.00626a Umfolozi Game Reserve (28°22'S: 31°52'E) on high bank of White Mfolozi River, grassland, sandy moist soil, 24 February 1990, 20 cl + 10 juv, JDP [associated with *natalensis*].

Description based on holotype and paratypes.

External characters:

General: body cylindrical, extended during preservation. *Colour*: holotype and paratypes preserved in alcohol for over six years do not reveal pigmentation; grey. *Dimensions*: holotype preserved, much extended, 75 mm long, 2 mm wide at 10, 2.5 mm wide at tubercula pubertatis; paratypes 55–80 mm long, 2 mm wide at 10, 3–4 mm at tubercula pubertatis. *Segment number*: holotype 197+ (complete number is uncertain, due to poor preservation); paratype 163. *Prostomium*: prolobous, small. *Segmentation*: secondary annulation present on preclitellar segments; 1 and 2 short, simple, with obvious intersegmental furrow 1/2, both segments with irregular longitudinal grooves; 3 simple; 4–8 with two ringlets, first longer than second; 9 with two ringlets, second short; 10 and the following simple, postclitellarly randomly demarcated. *Setae*: minute, closely paired. *Nephridial pores*: not observed. *Female pores*: obvious on paratypes, paired in 14 below *c* setae. *Male pores*: externally not observed; possibly in intersegmental furrow 18/19, as vasa deferentia enter body wall in 18. *Spermathecal pores*: externally not observed.

Clitellar region (Figs 2–3): *Clitellum*: saddle-shaped, white, elongated, clearly segmented, on 1/n11,12–28,29; anterior and posterior borders not clearly marked; anteriorly ventral borders extend to line of papillae located on *ab* setae; on 18–27 bordering tubercula pubertatis. *Tubercula pubertatis*: on holotype and paratypes well developed glandular tubercles, segmented, on 18,19–27,28; ventrally extending to *ab* setae. *Papillae*: different sizes and shapes, glandular, encircling *ab* setae on first ringlets of 5–7 and also on 11–18 (Fig. 3).

Internal characters:

Septa: 4/5 thin, 5/6 and 6/7 most thickened; 7/8 and 8/9 little thickened. *Gizzard*: cylindrical, large, muscular, in 7. *Calciferous glands*: in 10 large, separated dorsally and ventrally. *Intestine*: commences in 13. *Typhlosole*: in holotype commences in 20 as thin tube, slightly enlarging backwards, terminating in segment 75. *Dorsal blood vessel*: 4–8 double, separated; 9 double, close, cordiform. *Paired dorsoventral vessels*: 4–8 enlarged vessels; 9–11 moniliform. *Nephridia*: meganephridia; little coiled loops with thin, extended caeca. *Spermiductal funnels*: holandric arrangement; two pairs, each closely connected posteriorly with anterior parts of seminal vesicles, in 10 and 11 respectively. *Vasa deferentia*: difficult to observe due to softened body wall and decomposed tissues; probably enter body wall at posterior part of segment 18. *Seminal vesicles*: two pairs of large sacs commencing at septa 10/11 and 11/12 respectively. *Spermathecae*: small, elongated thecae in 8 and 9; 1–2 at each side, close to intersegmental furrow 8/9 and 9/10 respectively; ectal parts probably in 8/9 and 9/10, although anterior not confirmed. *Ovaries*: not observed. *Genital glands*: glandular tissues in 15, and 18–27 associated with internal glands of tubercula pubertatis.

Biological notes: Mapelane Nature Reserve comprises coastal dune forests extending southwards from the Mfolozi riverbank with a variety of woodland patches and grasslands. Holotype and some paratypes were found at the edge of large patches of grassland, about 10 km south from the river mouth. The other paratypes were collected north-west of the holotype site on the bank of the White Mfolozi River, covered by high indigenous grasses, and were associated with *natalensis*. Both localities are similar in vegetation and soil. Transportation of cocoons or individuals by water or in mud can be expected.

Distribution: Known only from the Mfolozi River banks (Fig. 1).

Discussion: A distinctive species although similar and probably related to *quaerus* described below. Both species have spermathecae in segments 8 and 9. The location of spermiductal pores in intersegmental furrow 8/9, however, was not confirmed in *distasmosus*. *M. distasmosus* also differs from *quaerus* in the length and position of the clitellum, shape of tubercula pubertatis, and thickness of preclitellar septa. In the other species of *Microchaetus* the most anterior position of spermathecal pores was observed in *namaensis* (known only from the Northern Cape) which has the anterior pores in 9/10 and the posterior in intersegmental furrows 10/11 11/12 respectively. In the other two holandric genera *Tritogenia* and *Michalakus*, the most anterior positions of spermathecal pores are in intersegmental furrows 10/11 11/12 in *Tritogenia shawi* and *T. soleata*, and in 10/11 11/12 12/13 in *Michalakus initus*.

It is noteworthy that in some members of the genus *Proandricus* assigned to the *lesothoensis*-species group, the utmost anterior spermathecal pores occur in 9/10, or between ringlets in segment 9 (*Proandricus amphius* sp. n. and *P. oresbiosus* sp. n.).

Microchaetus idechoritus sp. n.

(Figs 4–5)

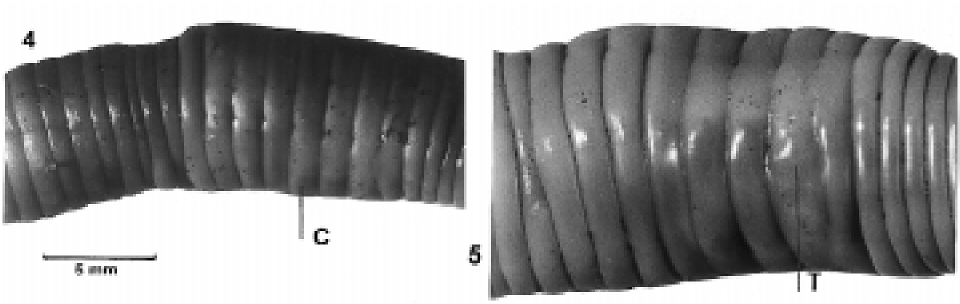
Etymology: G. *ide* = forest, G. *chorites* = indigenous. Refers to the species habitat.

Material examined: **KwaZulu-Natal**: Holotype NMSA/Olig.02188 Ngele Forest (30º35'S:29º41'E) indigenous forest, from first 20 cm of black, moist soil, 24 November 1995, JDP, BRS. Paratype NMSA/Olig.03716 one not fully mature, abscised postclitellarly, collected with holotype.

Description based on holotype and paratype.

External characters:

General: body cylindrical, contracted during preservation. *Colour*: holotype and paratype preserved in alcohol dorsally violet, ventrally yellowish-grey. *Dimensions*: holotype



Figs 4–5. *Microchaetus idechoritus* sp. n., holotype. 4. Dorsal view of clitellar region. 5. Lateral view, with enlarged area of tuberculum pubertatis. [C = clitellum, T = tuberculum pubertatis].

preserved, slightly contracted 115 mm long, 5 mm wide at 10, 7 mm wide at tubercula pubertatis; paratype abscised 94+ mm long, 5 mm wide at 10, 7 mm at tubercula pubertatis. *Segment number*: holotype 198. *Prostomium*: prolobous, moderate. *Segmentation*: secondary annulation present on preclitellar segments; 1 and 2 short, with clear intersegmental furrow 1/2, both segments with irregular longitudinal grooves; 3 simple, long as 1+2; 4–8 with two ringlets similar in size and appearance; 9 with two ringlets, second shorter than first; 10 and following simple. *Setae*: closely paired; *ab* = *cd*, *aa* > *bc*. *Nephridial pores*: obvious, in *c* or little below *c* setae. *Female pores*: paired in 14, above *b* setae. *Male pores*: obvious, in 18 above *b* setae, with elongated small swellings. *Spermathecal pores*: externally not observed; locations of spermathecae indicate intersegmental furrows 13/14 and 14/15 respectively.

Clitellar region (Figs 4–5): *Clitellum*: saddle-shaped, white, elongated, clearly segmented, on 12–21 with anterior and posterior borders clearly marked; on 12–15 ventral borders extend to *ab* setae; on 16–18 bordering tubercula pubertatis; on 19–21 covering only dorsal parts of segments. *Tubercula pubertatis*: on holotype elongated glandular, segmented, yellowish tissues on 16–18; ventrally extending to *b* setae, dorsally below nephridial pores. *Papillae*: paired, small, glandular swellings on 10 and 12, encircling *ab* setae.

Internal characters:

Septa: 4/5 5/6 and 6/7 thin; 7/8 and 8/9 thickened moderately, muscular, both similar in size and appearance; 9/10 and other septa thin. *Gizzard*: cylindrical, large, muscular, in 7. *Calciferous glands*: in 9, dorso-ventral, separated dorsally and ventrally. *Intestine*: commences in 13. *Typhlosole*: in holotype commences in 13 as large U-shaped tube, enlarging backwards, and terminates in 136. *Dorsal blood vessel*: 6–7 partly double, partly separated; 8 double, separated, 9 close, cordiform. *Paired dorsoventral vessels*: 5–8 thin; 9–11 moniliform. *Nephridia*: meganephridia; coiled loops with extended V-shaped caeca. *Spermiductal funnels*: holandric arrangement; two pairs of large funnels in 10 and 11 respectively, both closely connected at their posterior parts with seminal vesicles; anterior pair iridescent, posterior not iridescent. *Vasa deferentia*: two obvious ducts closely connected, commencing at lateral side of posterior pair of spermiductal funnels, run backwards to anterior part of segment 18. *Seminal vesicles*: one large pair of sacs commencing at septum 10/11, closely attached to spermiductal funnels, extends into segment 11 and terminates at 11/12. *Spermathecae*: in holotype, elongated club-shaped thecae in 14 and 15; anteriorly paired; posteriorly much smaller, 3 at left side, 2 at right side. In aclitellate paratype developing tubercula pubertatis, spermathecae were not observed. *Ovaries*: not observed. *Genital glands*: flat, small glands in 9–12; in 14–17 finger-shaped composite of 2–3 parts; in 18 composite of 4 long finger-shaped glands.

Biological notes: Ngele Forest, part of the much larger forest complex of Weza State Forest, incorporates natural vegetation of *Podocarpus* trees, thick bush and shrubs characteristic of afromontane forests. Although this complex was surrounded by plantations of pine, cypress and poplar trees, these were absent at the collecting site. Thick layers of decomposing litter and black moist soil were abundantly inhabited by microchaetid *Tritogenia ngelensis* Plisko, 1997, indigenous acanthodrilid of the genus *Parachilota*, and by introduced *Dendrodrilus rubidus* (Savigny, 1826) of Lumbricidae. However, only two *idechoritus* specimens were collected.

Distribution: Known only from the indigenous part of the Weza State Forest (Fig. 1 Ngele Forest), in southern KZN.

Discussion: A distinct species with spermathecal pores in intersegmental furrows 13/14 and 14/15, and male pores in segment 18. Only three other species of this genus, *herberti*, *natalensis* and *parvus*, have their spermathecal pores in these furrows. However, all four species differ in general appearance, size, position of clitellum, and shape of tubercula pubertatis.

Microchaetus quaerus sp.n.

(Fig. 6)

Etymology: L *quaero* = seek to learn. Refers to the unusual conjunction of internal characters noted in this species.

Material examined: **KwaZulu-Natal**: Holotype NMSA/Olig.03659 Hluhluwe Game Reserve, Mbombe Forest (28º03'15"S:32º03'12"E) at 484 m, forest valley, slightly damp sandy-clay next to water-seep, 30 September 2002, AJA, DG. Paratypes: NMSA/Olig.03664, 2 cl + 1 juv collected with holotype.

Description based on holotype and paratypes.

External characters:

General: body cylindrical. *Colour*: holotype, clitellate and juvenile paratypes preserved in alcohol for only a few days do not reveal pigmentation; grey-pinkish dorsally and ventrally. *Dimensions*: holotype preserved, slightly contracted, 104 mm long, 6 mm wide at 10, 8 mm wide at tubercula pubertatis; clitellate paratype 94 mm long, 6 mm wide at 10, 7 mm at clitellum; juvenile paratype 42 mm long, 3 mm wide. *Segment number*: holotype 180, clitellate paratype 170. *Prostomium*: prolobous, small, retracted into buccal cavity. *Segmentation*: secondary annulation present on preclitellar segments; 1 and 2 short, simple, with clear intersegmental furrow 1/2, both with irregular longitudinal grooves; 3 simple; 4–5 with two ringlets similar in size and appearance; 6 with two ringlets, first longer than second; 7–8 subdivided incompletely, 9 only partly demarcated; 10 and following simple, postclitellarly randomly demarcated. *Setae*: minute; in front of clitellum *aa* < *bc*, *ab* = *cd*. *Nephridial pores*: not observed. *Female pores*: obvious, paired, in 14 above *b* setae. *Male pores*: externally not observed; possibly in intersegmental

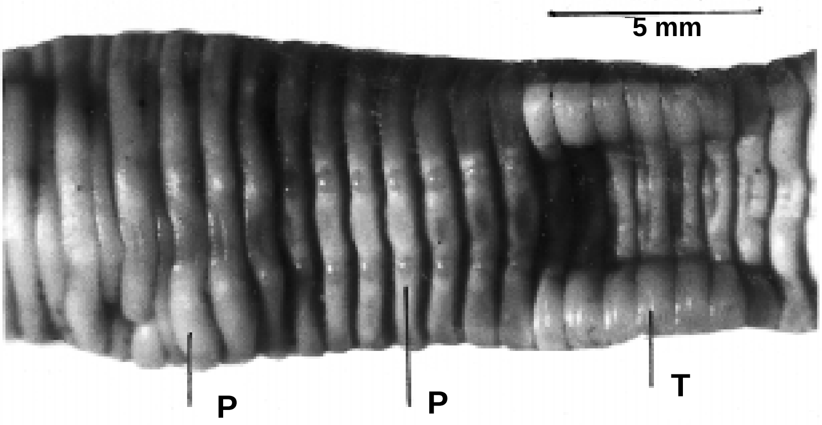


Fig. 6. *Microchaetus quaerus* sp. n., holotype, ventral view with tubercula pubertatis and papillae. [P = papilla, T = tuberculum pubertatis].

furrow 18/19, as indicated by vasa deferentia entering body wall in segment 18. *Spermathecal pores*: externally difficult to trace, observed only at one side of one paratype, in intersegmental furrow 8/9; ectal parts of spermathecae were observed during dissection in intersegmental furrows 8/9 and 9/10 respectively.

Clitellar region (Fig. 6): *Clitellum*: whitish-grey; elongated, clearly segmented; on 11–27, anterior and posterior borders are not clearly marked; anteriorly ventral borders extend to line of papillae located on *ab* setae; on 19–24 bordering tubercula pubertatis; thin clitellar tissues also cover ventral parts of clitellar segments. *Tubercula pubertatis*: on holotype and paratypes glandular, segmented, elongated strips, on 19–24; ventrally extending to *ab* setae. *Papillae*: prominent, glandular, encircling *ab* setae on 7–10 and 25–27; on 11–18 small globular blisters on *ab* setae.

Internal characters:

Septa: 4/5 thin, 5/6–6/7 slightly thicker than anterior; 7/8 and 8/9 thin. *Gizzard*: cylindrical, large, muscular, in 7. *Calciferous glands*: in 10, large, with only slightly marked separation dorsally; ventral separation little wider, although not apparent. *Intestine*: commences in 13; 10 pairs of yellowish, prominent, twice-folded dorso-lateral intestinal folds in segments 23–32. *Typhlosole*: commences in 17 as thin, flat tube; enlarging backwards changes into large U-shaped. In paratype terminates in segment 75. *Dorsal blood vessel*: 4–8 double, separated; 9 double, close, cordiform. *Paired dorsoventral vessels*: 4–8 enlarged vessels; 9–11 much enlarged, moniliform. *Nephridia*: meganephridia; little coiled loops with extended, ribbon-like caeca. *Spermiductal funnels*: holandric arrangement; two pairs, free, in 10 and 11 respectively. *Vasa deferentia*: commencing on lateral sides of spermiductal funnels in 10 and 11 respectively, extend and run to segment 18; penetrations into body wall occur probably at intersegmental furrow 18/19, but it was not confirmed. *Seminal vesicles*: two pairs of large sacs commencing at septa 10/11 and 11/12 respectively. *Spermathecae*: small, elongated thecae in 8 and 9; 2–4 at each side, with ectal parts in intersegmental furrows 8/9 and 9/10 respectively. *Ovaries*: not observed. *Genital glands*: glandular tissues in 19–24 associated with tubercula pubertatis.

Biological notes: Hluhluwe Game Reserve, situated between altitudes of 80–540 m, has lower-lying valleys and high ridges. It comprises coastal scarp forest with various thickets of mixed scrub, woodland, grasses and riparian vegetation. The species was found in moist sandy-clay soil in a higher, forested part, near seeping water. Mature individuals together with juveniles collected at the beginning of spring suggest sexual activity during a relatively mild winter. Associated with *Proandricus beddardi*. Acanthodrilidae were found nearby.

Distribution: Known only from the type locality (Fig. 1).

Discussion: Distinctive in having spermiductal pores in intersegmental furrows 8/9 and 9/10. Spermiductal pores in intersegmental furrow 8/9 do not occur in any other known microchaetid species. In *Microchaetus* the most anterior position of spermathecal pores was observed in *namaensis* (known only from the Northern Cape) whose anterior pores are in 9/10 and the other two rows of pores occur in intersegmental furrows 10/11 and 11/12 respectively. In the holandric genera *Tritogenia* and *Michalakus* the most anterior position of spermathecal pores is in intersegmental furrows 10/11 and 11/12 (*Tritogenia shawi* and *T. soleata),* and in *Michalakus initus* in 10/11, 11/12, 12/13. In some proandric species of the *lesothoensis* species-group the utmost anterior spermathecal pores occur in 9/10, or between ringlets in segment 9 (*Proandricus amphius* sp. n. and *P. oresbiosus* sp. n.). *M. quaerus* differs from congeners in the shape and positions of clitellum, tubercula pubertatis, and thickness of preclitellar septa.

Microchaetus benhami Rosa, 1891

Microchaeta benhami Rosa, 1891: 382; Reynolds & Cook 1976: 77 [‘*Typus amissus*’].
Microchaetus benhami: Michaelsen 1900: 451, 1913*a*: 538, 1913*b*: 61, 1918: 316; Pickford 1975: 24; Reynolds & Cook 1976: 77 [‘*Typus amissus*’]; Plisko 1992: 342, 1995*b*: 46 [designation of a lectotype using material collected in Western Cape province, deposited in ZMH].

Remarks: Rosa (1891) described this species with no indication on the type locality. Michaelsen (1900 1913*a b* 1918) and Pickford (1975) referred to the type collection site as ‘locality unknown’. Michaelsen (1913*a b* 1918) and Pickford (1975) recorded species from arable soil in the area of Cape Town and Stellenbosch. Plisko (1992) discussed the similarity and relationships between *mkuzi* collected in KZN and *benhami* known from Western Cape, and considered the possibility of introduction of *benhami* into cultivated fields in Western Cape. No more material of *benhami* is known from Western Cape, and no occurrence of this species has been established in KZN.

Microchaetus caementerii Michaelsen, 1913

Microchaetus papillatus Benham, 1892 var. *caementerii* Michaelsen, 1913*c*: 429; Reynolds & Cook 1976: 83.
Microchaetus caementerii; Michaelsen, 1918: 321; Pickford 1975: 23; Plisko 1991: 282 [redescription of paratype], 1992: 340; 1995*b*: 49 [designation of lectotype], 1998: 260; Reynolds & Cook 1993: 23.
Microchaetus caementerii cf. *M. papillatus* var. *caementerii*; Reynolds & Cook 1976: 83.

Remarks: Michaelsen (1913*c*) described this species on material collected from a graveyard in Pietermaritzburg, and from neighbouring Howick, with no designation of holotype. Plisko (1995*b*) designated a lectotype from material deposited in the Natal Museum. A specimen housed in ZMH is a paralectotype. The type locality in Pietermaritzburg is presently built over. A few specimens have been collected in isolated patches of undisturbed grass in the Pietermaritzburg area, and in indigenous grassland near the city. The species has only been observed in confined areas and in small populations, and may be under threat of extinction. No new material has been obtained since 1991 (Plisko 1992). Collection sites are shown in Fig. 1.

Microchaetus natalensis (Kinberg, 1867)

Geogenia natalensis Kinberg, 1867: 100; Perrier 1886: 876; Beddard 1895: 636; Michaelsen 1899*b*: 428; Reynolds & Cook 1976: 143.

Geogenia (Microchaeta?) natalensis; Michaelsen 1899*b*: 428 [redescription].

Geogenia (Microchaetus?) natalensis; Michaelsen 1900: 462.

Microchaetus natalensis; Michaelsen 1913*c*: 422, 1918: 324; Brinkhurst & Jamieson 1971: 739; Pickford 1975: 23; Reynolds & Cook 1976: 143; Plisko 1991: 287, 1992: 345, 1993*b*: 235, 1995*a*: 281, 1998: 273; Reynolds 1993: 6.

Material examined: **KwaZulu-Natal**: Hlatikulu Forest Reserve: NMSA/Olig.03636 (27°19'23"S:31°59'32"E) forest floor, rocky area, at surface of dry soil, between *Oplismenus* grass, 1 cl + 1 juv; NMSA/Olig.03637 (27°19'23"S:31°59'32"E) forest floor, under rock 10 cm under surface soil, 1 juv in quiescent state, regenerating posterior segments; all collected 21 August 2002 by AJA, D. Swanepoel, C. Hanekom, R. Scott-Shaw. NMSA/Olig.00626 Umfolozi Game Reserve (28°22'S:31°52'E) on high bank of White Umfolozi River, grassland sandy soil, 24 February 1990, 1 with tubercula pubertatis, JDP [associated with *distasmosus*]. NMSA/Olig.03377 Otto's Bluff, Martin's Farm (29°28'56"S:30°22'11"E) from wet soil under wattle bush and indigenous grassland, 12 January 2001, 5 cl + 6 juv, JDP, AJA, TN [associated with *Microchaetus parvus* and *Michalakus initus*].

Remarks: Of all known microchaetids, this species is the most widely distributed. It is known from numerous sites in KZN (Fig. 1), Mpumalanga and Limpopo provinces (Kinberg 1867; Michaelsen 1899*b* 1913*c*; Plisko 1991 1992 1995*a* 1998), and Swaziland (Reynolds 1993). Its occurrence is predicted in Mozambique, and possibly in south-eastern Zimbabwe. Collected from grasslands, forested habitats, under bushes, and in river banks. Sporadically found in decaying organic matter and in newly transformed natural biotopes such as gardens or agricultural fields. Often associated with other microchaetids, indigenous acanthodrilids, and introduced species of Megascolecidae, Glossoscolecidae and Lumbricidae.

Microchaetus papillatus Benham, 1892

Microchaeta papillata Benham, 1892: 141; Beddard 1895: 672;

Microchaetus papillatus; Michaelsen 1900: 450, 1907: 5, 1918: 320; Pickford 1975: 23; Plisko 1992: 345, 1993*b*: 235, 1998: 281.

Microchaetus papillatus f. typicus Michaelsen 1913*c*: 426.

Microchaetus papillatus cf. *Microchaeta papillata*; Reynolds & Cook 1976: 150.

Remarks: Species confined to undisturbed areas between Pietermaritzburg and Durban (Fig. 1). At the time of its description its distribution was probably much broader. Populations in and around Durban and Pietermaritzburg have probably been reduced or eliminated by agricultural and industrial development. No new material has been available since collections reported by Plisko (1992 1998).

Microchaetus parvus Michaelsen, 1913

Microchaetus parvus Michaelsen, 1913*c*: 445; Michaelsen 1918: 331; Reynolds & Cook 1976: 152, 1993: 27; Plisko 1991: 279 [re-description], 1992: 349, 1998: 282.

Material examined: **KwaZulu-Natal**: Thukela River Valley, Farm Gannahoek: NMSA/Olig.02781 (28°39'28"S:29°59'00"E) at 890 m, on bank of small stream from soil with tuft of grass, weeds and herbs, 6 December 1999, 4 cl + 2 juv ; NMSA/Olig.02785 (28°39'32"S:29°59'03"E) at 900 m open rocky grassland, scattered trees at east slope, 6 December 1999, 5 cl + 3 juv; NMSA/Olig.02779 (28°40'12"S:29°59'58"E) edge of stream bed at base of rocky bank, with loose sandstone rock on; shallow soil, from soil and grass roots, 5 December 1999, 2 cl + 3 juv. NMSA/Olig.02784 (28°40'30"S:30°00'55"E) at 740 m, at the edge of Thukela River from stony soil, under tree, 6 December 1999, 7 cl + 5 juv; NMSA/Olig.02775 (28°40'31"S:30°00'40"E) under rotting plant debris in shallow drainage depression, on deep aluvial floodplain near Thukela River edge, 5 December 1999, 20 cl + 12 juv; NMSA/Olig.02777 (28°40'35"S:30°00'25"E) at 760 m, bed of old small dam, moist soil with good humus at rubbish dump, from upper 10 cm soil, 5 December 1999, 25 cl + 3 juv; NMSA/Olig.02774 (28°40'35"S:30°00'40"E) at 778 m under dead fallen *Aloe spectabilis* in accumulated rotting debris and captured soil on sandstone bedrock at base of slope edge of dry watercourse, 28 November1999, 4 cl + 5 juv. Thukela River Valley, Farm Ramak NMSA/Olig.02783 (28°41'30"S:30°02'35"E) at 700 m, east slope, from soil under dead fallen aloes, 50 m from edge of Thukela River, 5 December 1999, 1 cl + 2 juv; Thukela River Valley, Farm Groote Mielietuin: NMSA/Olig.02788 (28°53'52"S:29°59'35"E) at 1380 m, on hilltop, 16 December 1999, 6 juv; NMSA/Olig.02797 (28°53'55"S:29°59'30"E) at 1030 m, gentle sloping, open grassland, with scattered trees, 9 December 1999, 3 cl; NMSA/Olig.02791 (28°55'30"S:29°59'15"E) at 1040 m, steep rocky slope in dense stream bed vegetation, about 5 m above stream; soil rocky and with much roots, good leaf litter on surface, 15 December 1999, 1 semi-mature [associated with *Proandricus ortyi*]; all above recorded material collected by OB. NMSA/Olig.03380 Otto's Bluff, Wattle Grove (29°28'30"S:30°22'12"E) from wet soil under indigenous grassland, 12 January 2001, 3 cl + 7 juv, JDP, AJA, TN [associated with *natalensis* and *Michalakus initus*]. NMSA/Olig.03387 Impendle Nature Reserve (29°42'09"S:29°53'28"E) valley, forest, near stream in slightly moistsoil, 23 March 2001, 3 juv, PN, AJA. NMSA/Olig.03496 Port Shepstone, Armidale farm (30°39'39"S:30°30'19"E) at 102 m, recently burnt grassland, many herbs, patch at summit of dune, damp sandy soil, 4 November 2001, 2 cl, AJA, HM [associated with other microchaetids and introduced *Pontoscolex corethrurus* (Müller, 1857)].

Remarks: A species found in natural habitats as well as biotopes influenced by human activity. The broad distribution of this species may be due to an exceptional adaptability to survival under varied pedological conditions. It is often associated with other microchaetids and with introduced earthworms. Known from numerous localities in KZN (Fig. 1) (Michaelsen 1913*c*; Plisko 1991 1992 1998) and from Mpumalanga province (Plisko 1998).

Microchaetus pondoanus Michaelsen, 1913

Microchaetus pondoanus var. *typica* Michaelsen, 1913*a*: 542.
Microchaetus pondoanus Michaelsen, 1913*a* var. *minor* Michaelsen, 1913*a*: 547.
Microchaetus pondoanus var. *typica*; Reynolds & Cook 1976: 137.
Microchaetus pondoanus Michaelsen, 1913*a* var. *minor*; Reynolds & Cook 1976: 157.
Microchaetus pondoanus; Pickford 1975: 23; Reynolds & Cook 1976:157, 1993: 27; Plisko 1998: 288, 2002*b*: 210.

Material examined: **KwaZulu-Natal**: NMSA/Olig.02719 Ngele Forest, Weza (30º32'30"S:29º45'30"E) central area, 21 February 1999, 1 juv, C. T. Symes. NMSA/Olig.03700 Mpenjati Nature Reserve, Yengele Trial (30º58'S:30º17'E) dune forest, in leaf litter, 28 December 2002, 1 cl, D. G. Herbert. **Eastern Cape**: Mbotyi, at foot of forest scarp: NMSA/Olig.03771 coastal forest (31º27'S:29º44'E) in leaf litter, 1 March 2003, 4 cl; NMSA/Olig.03772 inland of lagoon at Mkozi stream mouth (31º27'S:29º45'E) in leaf litter, 2 March 2003, 5 cl; NMSA/Olig.03773 Mbotyi, coastal forest, various sites besides the road through upper section of forested scarp (31º26'S:29º44'E) in leaf litter, 3 March 2003, 7 cl [together with *Parachilota* sp.]; NMSA/Olig.03775 Port St. Johns, Isinuka sulphur springs and travertine deposit, woodland/forest (31º37'S:29º29'E) 6 cl; all material from Eastern Cape collected by D. G. Herbert.

Remarks: A species described and known from Pondoland (Michaelsen, 1913*a*). Recently collected material and that reported by Plisko (1998 2002*b*) show species occurrence in patches of indigenous forest situated at higher altitude areas of the Umtamvuna River catchment, and in coastal forest in the area bordering the two provinces KZN and Eastern Cape. Collection sites in KZN are shown in Fig. 1.

Microchaetus tuberosus Plisko, 1998

Microchaetus tuberosus Plisko, 1998: 290.

Material examined: **KwaZulu-Natal**: NMSA/Olig.03497 Port Shepstone, Armidale farm (30º39'39"S:30º30'19"E) at 102 m, recently burnt grassland, many herbs, patch at summit of dune, damp sandy soil, 4 November 2001, 5 cl, AJA, HM [associated with *Microchaetus parvus*]. NMSA/Olig.03630 Oribi Gorge Nature Reserve (30º43'49"S:30º16'22"E) summit at 451 m, grassland, 25 June 2002, 4 juv [in quiescent phase, without soil in the gut, posteriorly transparently reddish], AJA, D. J. Craigie, BK, L. Mnguni. NMSA/Olig.03631 Oribi Gorge Nature Reserve (30º43'50"S:30º16'24"E) east facing slope at 451 m, grassland/forest border, 25 June 2002, 1 cl + 1 juv, AJA, D. J. Craigie, BK, L. Mnguni [associated with *Pontoscolex corethrurus* (Müller, 1857)]. Mbumbazi Nature Reserve: NMSA/Olig.03405 (30º47'42"S:30º16'41"E) hillside, in forest on path, 27 March 2001, 1 with tubercula pubertatis, AJA, BK; NMSA/Olig.03404 (30º47'45"S:30º16'35"E) hillside, in forest near stream, 27 March 2001, 5 juv, AJA, BK; NMSA/Olig.03399 (30º47'45"S:30º16'43"E) hillside, in forest, 27 March 2001, 5 with tubercula pubertatis, AJA, BK; NMSA/Olig.03396 (30º48'06"S:30º16'30"E) hillside, under tall grass, along road, 26 March 2001, 5 juv, AJA, BK; NMSA/Olig.03397 (30º48'06"S:30º16'30"E) hillside, under tall grass, along road, 26 March 2001, 4 with tubercula pubertatis, AJA, BK; NMSA/Olig.03519 (30º48'09"S:30º16'47"E) at 372 m, sparse medium-high grass with shrubs and herbs, top layer soil, under casts, 5 November 2001, 3 not fully mature, AJA, HM; NMSA/Olig.03518

(30º48'12"S:30º16'47"E) hillside, recently burnt tall grass, between grass roots, damp soil, 5 November 2001, 11 juv, AJA, HM; NMSA/Olig.03517 (30º48'12"S:30º16'47"E) hillside, recently burnt tall grass, under grass roots, damp soil, 5 November 2001, 7 cl [much longer and with more segments than type material, and with various number and shape of spermathecae: 1–3 pairs per segment], AJA , HM. Umtamvuna Nature Reserve: NMSA/Olig.03406 (30º59'54"S:30º09'48"E) plateau, in vlei, medium-tall graminoids, 29 March 2001, 11 juv, AJA , BK; plateau, in vlei under medium graminoids (30º59'55"S:30º09'48"E): NMSA/Olig.03409, 1 cl, NMSA/Olig.03410, 8 juv, NMSA/Olig.03411, 2 cocoons, collected 29 March 2001 by AJA, BK, [associated with acanthodrilid of the genus *Parachilota*].

Remarks: A species described from the Oribi Gorge Nature Reserve and known from various places in its vicinity (Fig. 1). Present records extend the known range of the species to coastal lowlands in southern KZN. At some sites the species was associated with *parvus*, with an indigenous acanthodrilid of the genus *Parachilota*, or with the exotic glossoscolecid *Pontoscolex corethrurus* (Müller, 1857).

Microchaetus vernoni Plisko, 1992

Microchaetus vernoni Plisko, 1992: 349; Reynolds & Cook 1993: 22; 1998: 292.

Remarks: The longest microchaetid species recorded from South Africa, being in life over 2 meters long. Excreted casts are large, up to 240 mm in height and are recognised as good fertilisation for the soil (Plisko 1992). The species is known only from Vernon Crookes Nature Reserve (Fig. 1) and it was not found in neighbouring sugarcane plantations. Probably the reserve is the only relict of its natural habitat, a valuable oasis protecting this species from extinction. Associated with *M. zaloumisi* at some sites.

Michalakus Plisko, 1996

Michalakus Plisko, 1996*a*: 289.

Type species: *M. initus* by original designation. Type depository: Natal Museum, Pietermaritzburg, South Africa.
One species, endemic to KwaZulu-Natal.
Collection sites are shown in Fig. 1.

Holandric, with two oesophageal gizzards in segment 7 and 9, and one pair of nephridia per segment.

Michalakus initus Plisko, 1996

Michalakus initus Plisko, 1996*a*: 289.

Material examined: **KwaZulu-Natal**: NMSA/Olig.03378 Otto’s Bluff, Martin’s Farm (29º28'56"S:30º22'11"E) from wet soil under wattle bush and indigenous grassland, 12 January 2001, 7 cl + 17 juv, JDP, AJA, TN.

Remarks: Discovered originally in the middle section of Umgeni River Valley. This new record extends the known range of the species south-east of the type locality. In the latest site species was associated with *Microchaetus parvus* and *Microchaetus natalensis*.

Proandricus Plisko, 1992

Proandricus Plisko, 1992: 354.

Type species: _P. thornvillensis_ Plisko, 1992 by designation. Type depository: Natal Museum, Pietermaritzburg, South Africa.

Fifty one species known from South Africa and Lesotho (Table 2); 30 from KZN; 28 endemic to this province; eight species-groups recognized (Plisko 2000_b_), five known from KZN.

Species distribution in KZN is shown in Fig. 7.

Proandric, with oesophageal gizzard in segment 7, and one pair of nephridia per segment.

Three new species in _lesothoensis_ species-group (_adami_, _amphius_, _oresbiosus_), and one in the _belli_ species-group (_lovuus_), are described below. New data available for some of the species known from KZN are added in appropriate species groups.

TABLE 2.

The distribution of _Proandricus_ species.

Species marked with one asterisk are endemic to KwaZulu-Natal; those marked with two asterisks occur in KZN but have broader distributions as indicated. Those without an asterisk have not been recorded from KZN but occur in the provinces indicated.

_adami_*
_adriani_*
_alatus_*
algoensis = Eastern Cape
_amphius_*
_armstrongi_*
_babanango_*
_beddardi_*
belli = Eastern Cape
_bergvillensis_*
biancae = Eastern Cape
_bourquini_*
briani = Eastern Cape
brincki = Eastern Cape
_bulwerensis_*
_colletti_*
comptus = Mpumalanga
_crookesi_*
dwesa = Eastern Cape
_entumeni_*
_gracilis_*
_hedothecus_*
_hlatikulu_*
humicultor = Eastern Cape, Free State
ianthinos = Eastern Cape
_injasuti_*
_ivari_*
_jasoni_*
lesothoensis = LESOTHO
londti = SA: Gauteng; LESOTHO
_lovuus_*
magdae = Eastern Cape
marenzelleri = Eastern Cape
_marleyi_*
_martensi_*
_michelleae_*
mirificus = Eastern Cape
modestus** = Mpumalanga, Eastern Cape, Northern Cape
_oresbiosus_*
_ortyi_*
_pajori_*
perolofi = Eastern Cape
_richerti_*
sani = LESOTHO
setosus** = Mpumalanga
sirgelli = Western Cape
skeadi = Eastern Cape
_thornvillensis_*
timmianus = Eastern Cape
warreni = Eastern Cape
zicsi = Eastern Cape

The _warreni_ species-group

To this group, characterised by spermathecal pores in only one intersegmental furrow 12/13, are assigned: _warreni_ Michaelsen, 1913_a_, _crookesi_* Plisko, 2002, _londti_ Plisko, 1993, _zicsi_ Plisko, 1993. Of these, only _crookesi_, marked with an asterisk, is known from KZN. _P_. _warreni_ has been described from Pondoland, part of the area earlier known as Transkei. *P. londti* described from garden soil in the vicinity of Pretoria (Gauteng), then discovered in older material from Masite mountains. *P. zicsi* is known only from type locality in the Port Elizabeth district in the Eastern Cape. *P. crookesi* is known only from the Vernon Crookes Nature Reserve, and no new material is available.

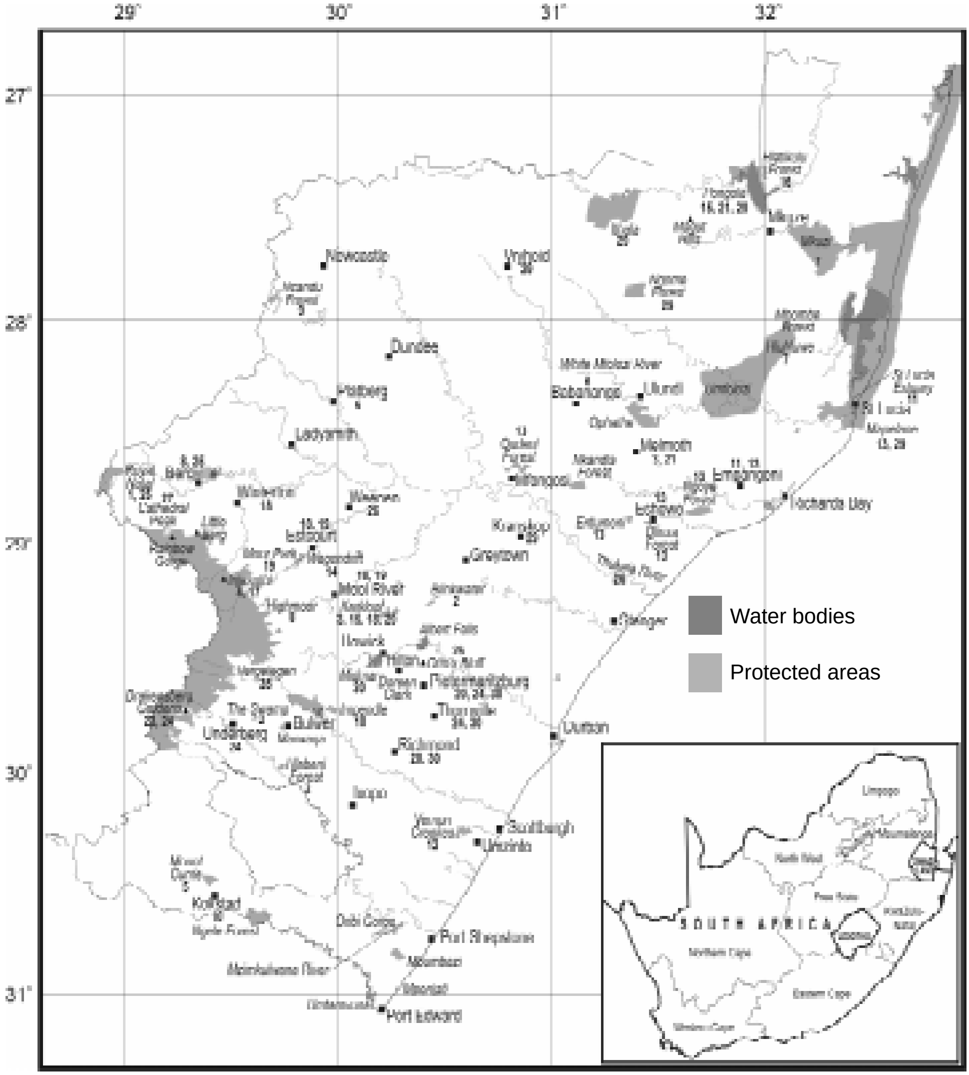


Fig. 7. The distribution of *Proandricus* species in KZN. 1 = *adami*; 2 = *adriani*; 3 = *alatus*; 4 = *amphius*; 5 = *armstrongi*; 6 = *babanango*; 7 = *beddardi*; 8 = *bergvillensis*; 9 = *bourquini*; 10 = *bulwerensis*; 11 = *colletti*; 12 = *crookesi*; 13 = *entumeni*; 14 = *gracilis*; 15 = *hedothecus*; 16 = *hlatikulu*; 17 = *injasuti*; 18 = *ivari*; 19 = *jasoni*; 20 = *lovuus*; 21 = *marleyi*; 22 = *martensi*; 23 = *michelleae*; 24 = *modestus*; 25 = *oresbiosus*; 26 = *ortyi*; 27 = *pajori*; 28 = *richerti*; 29 = *setosus*; 30 = *thornvillensis.*

The *lesothoensis* species-group

To this group, characterised by spermathecal pores occurring in one intersegmental furrow 10/11, or in two intersegmental furrows 9/10 and 10/11, or between ringlets of segment 9 and in intersegmental furrow 10/11, are assigned: *lesothoensis (*Reinecke & Ryke, 1969)*, adami** sp. n., *amphius** sp. n., *oresbiosus** sp. n., *bourquini**, *pajori**, and *sani* Plisko, 2002. Species marked with an asterisk are known from the Drakensberg escarpment in KZN. *P. sani* and *lesothoensis* were collected at high altitudes in the Drakensberg, and in adjacent Lesotho: *sani* near South African border, *lesothoensis* from the Maluti mountains. *P. pajori* is known only from the type material (Plisko 1993*a*). Collection sites in KZN are shown in Fig. 7.

Proandricus adami sp. n.

(Fig. 8)

Etymology: Named for Adam Shuttleworth in recognition of his interest in earthworms.

Material examined: **KwaZulu-Natal**: Holotype NMSA/Olig.02530 Drakensberg, Royal Natal National Park, on the bank of Devil's Hoek River (28°42'S:28°54'E), grassland, among roots, 4 December 1996, JDP, TL. Paratypes: NMSA/Olig.02531, 6 juv, collected with holotype; NMSA/Olig.00918, 1 cl, and NMSA/Olig.00919, 2 abscised cl + 8 juv, collected at Drakensberg foothills, Little Berg [south of the type locality] 2 March 1989, JDP, BRS.

Description based on holotype and paratypes.

External characters:

General: body cylindrical. *Colour*: in life and alcohol-preserved not pigmented, whitish-grey. *Dimensions*: preserved and slightly contracted holotype 60 mm long, 5 mm wide at 10, 6 mm at tubercula pubertatis. *Segment number*: holotype 92; paratype 103. *Prostomium*: prolobous, small, separated from first segment. *Segmentation*: secondary

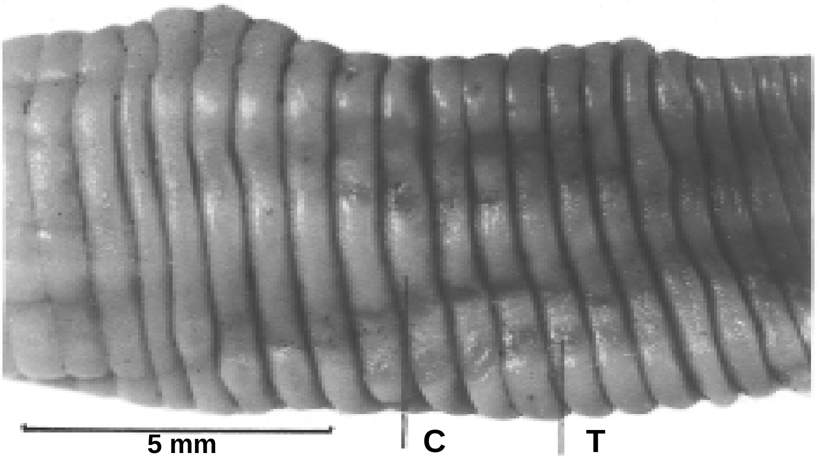


Fig. 8. *Proandricus adami* sp. n., holotype, ventral view with clitellar tissues and tubercula pubertatis. [C = clitellum, T = tuberculum pubertatis].

annulation present on preclitellar segments: 1 and 2 simple, with irregular longitudinal grooves; 3 simple; 4–8 with two simple ringlets similar in size and appearance; 9 with two ringlets, second shorter than first; 10, clitellar and postclitellar simple. *Setae*: moderate, closely paired; first pairs on 3; preclitellarly in regular rows, posteriorly selected pairs of *ab* sporadically shifted into inter-setal space between *bc*; on 28 *ab* = *cd*, *aa* > *bc*. *Nephridial pores*: obvious, in *ab* setal lines; first pair in 2/3. *Female pores*: paired, in 14, slightly below *cd* setae, deeply in clitellar tissues. *Male pores*: in 17, in tubercula pubertatis area, small, simple openings. *Spermathecal pores*: externally not observed; however, during dissection it was noticed that ectal parts of first spermathecal pair enter intersegmental furrow 9/10; ectal parts of second pair located in segment 10 enter into intersegmental furrow 10/11.

Clitellar region (Fig. 8): *Clitellum*: segmented, white, on 11,12–20,21; anteriorly clitellar tissues extending dorsally on part of 11; posterior border at intersegmental furrow 20/21 or 21/22; on some paratypes extending fully on 21; ventrally partially covering segments 12–15. *Tubercula pubertatis*: elongated oval strips, not covered by clitellar tissues, on 16–20, between *cd–ab* setae, separated from clitellar tissues. *Papillae*: little swellings, paired or single, on 10–13, 22, 23, around *ab* setae.

Internal characters:

Septa: 4/5 thickened, muscular; 5/6 and 6/7 not thickened, thin; 7/8 and 8/9 thickened, muscular; other septa thin, firm. *Gizzard*: globular, muscular, in 7. *Calciferous glands*: in 9, laterally; moderate, globular, distinctly separated dorsally and ventrally. *Intestine*: commencing in 13, developing into folded tube in following segments; in 21–27 dorsally covered by irregularly twisted paired folds. *Typhlosole*: commences in 21 or 22, terminates in holotype in 53. *Dorsal blood vessel*: double, close to each other in 5 and 7; slightly separated in 6, widely in 8; 9 enlarged, double, cordiform; 10 and following segments enlarged, simple; crossing septa simple. *Paired dorsoventral vessels*: 5–8 thin vessels, 9–11 enlarged, moniliform. *Nephridia*: Meganephridia; thin, elongated coiled loops with extended elongated caeca. *Spermiductal funnels*: proandric arrangement; one pair of large, iridescent funnels in 10, closely connected posteriorly with seminal sacs. *Vasa deferentia*: single, anteriorly thick ducts, commencing laterally in 10, extend through 11 and run over flat genital glands of segments 12–14, where become embedded in body wall. Ectal parts were not observed. *Seminal vesicles*: one pair of very large, composite sacs, irregular in shapes, commencing at septum 10/11 extending into 11 and pushing neighboring septum 11/12 expand into 12. Both sacs composed of variable in shape and size granulated lobes, communicating with base at 10/11, closely connected with spermiductal funnels. *Spermathecae*: in 9 and 10, one at each side; both pairs iridescent, with sperm. Anterior spermathecae narrow, club-shaped, much smaller than posteriors, with ectal parts entering body wall at intersegmental furrow 9/10. Posterior spermathecae very large, oval, with long curved ectal ducts entering intersegmental furrow 10/11. *Ovaries*: not observed. *Genital glands*: small, flat, twice- or three-folded glands, in some of segments 9–13.

Biological notes: The species was collected in the central Drakensberg mountains, in an area protected by KZN Wildlife, in indigenous grassland slope, and in river-bank beyond the boundaries of the park. Mature and juvenile specimens were collected in both sites during summer. Iridescence observed in spermathecae confirm species sexual reproduction.

Discussion: The location of spermathecae in segments 9 and 10 is diagnostic for the *lesothoensis* species-group. The species is similar to *amphius* described below. The shape and position of clitellum and tubercula pubertatis resemble those of *amphius*. The typhlosole and intestine folds are also similarly located. The species differ in the postclitellar arrangement of setae and location of anterior pair of spermathecal pores. In *adami* pores are in the intersegmental furrow 9/10, and their activity is confirmed by the presence of sperm in the anterior spermathecae. In *amphius* the spermathecae are empty with their ectal parts entering the intra-segmental body wall in segment 9, a condition presently known only in *amphius* and *sani*.

Distribution: Known from the Drakensberg mountain range in western KZN (Fig. 7).

Proandricus amphius sp. n.

(Fig. 9)

Etymology: Gr. *amphi* = around, on both sides. Refers to the clitellum encircling the segments.

Material examined: **KwaZulu-Natal**: Holotype NMSA/Olig.03620 Drakensberg, section of Giant’s Castle Game Reserve, Injasuthi (29°06'51"S:29°26'34"E) opposite camp, hillside at *ca*. 1540 m, at south-facing slope, wooded grassland at edge of dry drainage in *Protea* savannah, 2–10 cm below surface among roots of medium-tall *Themeda* grass, 14 June 2002, AJA. Paratypes: NMSA/Olig.03621, 9 cl; NMSA/Olig.03627, 10 juv. All collected with holotype.

Description based on holotype and paratypes.

External characters:

General: body cylindrical, compact. *Colour*: in life, and preserved in alcohol, whitish-grey, not pigmented. *Dimensions*: preserved and slightly contracted holotype 66 mm long, 4 mm wide at 10, 5 mm at tubercula pubertatis; clitellate paratypes 55–67 mm long. *Segment number*: holotype 120, paratypes 126–131. *Prostomium*: prolobous, small. *Segmentation*: secondary annulation present on preclitellar segments; 1 and 2 simple, with irregular longitudinal grooves; 3 simple; 4–9 with two simple ringlets similar in size and appearance; 10 and 11 simple, longer than anterior ringlets; clitellar simple, similar in size, postclitellar simple, shorter than clitellar. *Setae*: minute, closely paired

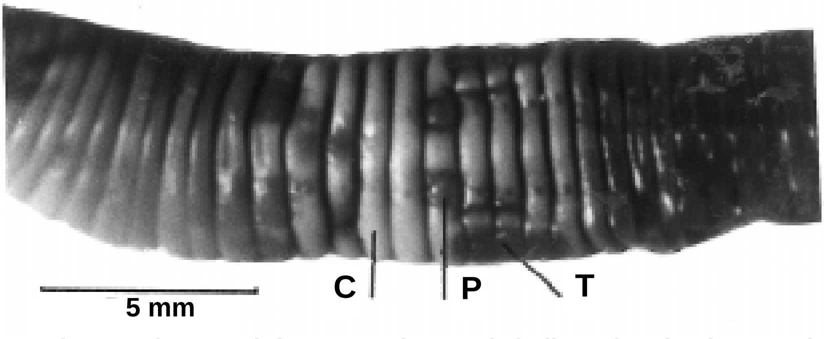


Fig. 9. *Proandricus amphius* sp. n., holotype, ventral view with clitellum, tubercula pubertatis and papillae. [C = clitellum, T = tuberculum pubertatis, P = papilla of segment 16].

in regular rows; preclitellarly *ab* = *cd*, *aa* > *bc*, at posterior end *aa* = *bc*. *Nephridial pores*: conspicuous, below *cd* setal lines. *Female pores*: paired, in anterior part of 14, laterally, slightly below *cd* setae. *Male pores*: in 17, in tubercula pubertatis area between *ab* and *cd* setae. *Spermathecal pores*: externally not observed. However, during dissection it was observed that ectal parts of first spermathecal pair were entering into thick body wall near furrow located between ringlets of segment 9. Pores were not noted. Ectal parts of second pair located in 10, although also deeply embedded in wall tissues, were extended into intersegmental furrow 10/11.

Clitellar region (Fig. 9): *Clitellum*: on holotype and mature paratypes segmented, white, encircling segments 1/n11,12–20,1/n21, leaving uncovered by clitellar tissues only area of tubercula pubertatis and some small ventral parts of segment 12 in area of *ab* setae; anterior border not well marked, with clitellar tissues extending only partly dorsally on 11; posterior border at intersegmental furrow 20/21, on some paratypes extending partially on 21. On less developed paratypes clitellar tissues ventrally were much thinner than those of mature individuals. *Tubercula pubertatis*: well developed elongated strips, not covered by clitellar tissues, on 1/n16–1/n20, between *cd* and *ab* setae, with shallow grooves separating each strip from clitellar tissues. *Papillae*: prominent, sucker-like swellings, paired, on 16 around *ab* setae (Fig. 9); both papillae associated with genital glands. On one paratype papillae are displaced: right one on segment 16, left one on 17.

Internal characters:

Septa: 4/5 5/6 thickened moderately, elastic, strong; 6/7 not thickened, thin; 7/8 most thickened, 8/9 thickened less than 7/8; other septa thin, firm. *Gizzard*: globular, muscular, in 7. *Calciferous glands*: in 9, small, globular, distinctly separated dorsally and ventrally. *Intestine*: commences in 13, in following segments developing into folded tube; in 21–27 dorsally covered by irregularly twisted folds. *Typhlosole*: commences in 21 or 22, terminates in holotype in 53. *Dorsal blood vessel*: 5–7 thin, double, close; 8 double, separated; 9 enlarged, double, cordiform; in 10 and following segments enlarged and simple; simple when crossing septa. *Paired dorsoventral vessels*: 5–8 thin vessels, 9–11 enlarged, moniliform. *Nephridia*: meganephridia; coiled loops with extended V-shaped caeca. *Spermiductal funnels*: proandric arrangement; one pair of large, iridescent funnels, enclosed in sacs closely connected posteriorly at septum of 10 with seminal sacs. *Vasa deferentia*: distinct single ducts commencing at lateral parts of spermiductal funnels, run backwards at each side of the body to posterior parts of 16, entering body wall in anterior part of 17. Connections with male pores are covered by body wall, however, externally marked male pores indicate on their termination in 17. *Seminal vesicles*: one pair of composite sacs, commencing at septum 10/11 extending into 11, where pushing, although not interrupting septum 11/12, occupies space of 12. Sacs, variable in shape and size, consist of granulated lobes connected with spermiductal funnels at their base. *Spermathecae*: in 9 and 10; anterior pair differ in size and shape from posterior pair, being elongated duct, with no sperm, and entering body wall in 9; it is however not clear if ducts penetrate whole thickness of the body tissues, or ducts are ending blindly. Large, elongated-oval, iridescent ampullae with long, curved ducts of posterior pair enter intersegmental furrow 10/11. In all dissected mature specimens posterior pair was full of sperm, although anterior pair was always empty. *Ovaries*: not observed. *Genital glands*: one pair in 16 associated with papillae; both glands flat, twice- or three-folded, moderate in size.

Biological notes: The species was collected at Injasuthi, an area of the Giant's Castle Game Reserve, in the Drakensberg foothills, protected by KZN Wildlife, where there are large open areas of indigenous grassland and patches of indigenous bushes. Mature and juvenile specimens were found in winter, at an altitude over 1500 m. Iridescent posterior spermathecae and spermiductal funnels observed in mature individuals indicate maturity and sexual activity in late summer, extended into late autumn and possibly also in early winter. The species was found in association with an indigenous acanthodrilid of the genus *Udeina*.

Discussion: The location of spermathecae in segments 9 and 10 suggest assignation to the *lesothoensis* species-group. The species is similar to *adami* sp. n. having clitellum encircling body, although in the last species encircling is not complete. However the species differ in the location of the pores of the anterior spermathecae. Similar to *sani*, having anterior pair of spermathecae in segment 9 with ectal parts entering intra-segmental body wall, a condition rarely observed in microchaetids. In the other species of the *lesothoensis* species-group, the spermathecal pores are in intersegmental furrows 9/10 and 10/11 (*adami* sp. n., *lesothoensis* and *bourquini*) or only in 10/11 (*pajori*). *P. amphius* differs from *sani* by having the clitellum encircling the clitellar segments dorsally and ventrally, with the exception of tubercula pubertatis and small anterior portion of segment 12 in the area of *ab* setae and papillae. The lack of sperm in anterior spermathecae and entirely filled posterior pair observed in *amphius* suggests that during copulation the sperm may not enter anterior spermathecae. It is possible that ectal parts of the first spermathecal pair are not completely developed.

Distribution: The species is known only from the type locality (Fig. 7), in an area where some other species of the *lesothoensis* species-group are known to occur.

Proandricus oresbiosus sp. n.

(Figs 10–11)

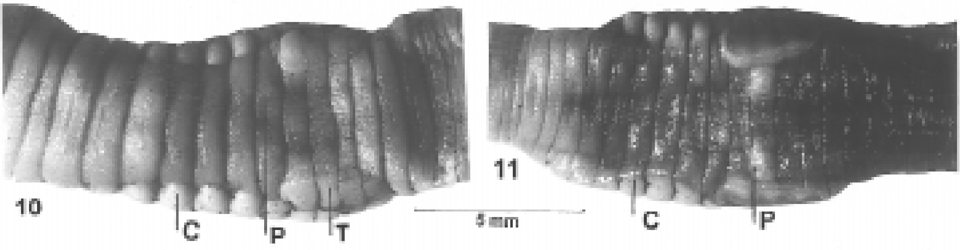
Etymology: G. *oresbios* = living in or on mountains. The species name refers to the type locality situated in the Drakensberg mountain range.

Material examined: **KwaZulu-Natal**: Holotype NMSA/Olig.02440, Drakensberg, Royal Natal National Park, north side of Devil's Hoek River (28°41'S:28°53'E) grassland, under rock, 4 December 1996. Paratypes: NMSA/Olig.02434 *ca*. 28 km north-west of Bergville (28°42'S:29°22'E) primary grassland, between roots of various plants, from sandy moist soil, 5 December 1996, 3 cl +1 juv. All collected by JDP and TL.

Description based on holotype and paratypes.

External characters:

General: body cylindrical. *Colour*: in life and alcohol-preserved, grey, not pigmented. *Dimensions*: preserved and slightly contracted holotype 90 mm long, 4,5 mm wide at 10, 6 mm at tubercula pubertatis; clitellate paratypes 75–102 mm long. *Segment number*: holotype 106, paratypes 117–138; juvenile 120. *Prostomium*: prolobous. *Segmentation*: secondary annulation present on preclitellar segments; 1 and 2 simple, with irregular



Figs 10–11. *Proandricus oresbiosus* sp. n. 10. Holotype, ventral view with clitellum, tubercula pubertatis and papilla of segment 16. 11. Paratype, ventral view with clitellum and papillae of segment 18. [C= clitellum, T = tuberculum pubertatis, P = papilla].

longitudinal grooves; 3 simple; 4–6 with two simple ringlets similar in size and appearance; 7–9 with two ringlets, second shorter than first; 10, 11, clitellar and postclitellar simple. *Setae*: minute, closely paired in regular rows, although *ab* setae on some segments are slightly shifted medially; first pairs on 3. *Nephridial pores*: obvious in *cd* setal lines; first pair in intersegmental furrow 2/3. *Female pores*: not observed. *Male pores*: probably in intersegmental furrow 16/17. *Spermathecal pores*: externally not observed.

Clitellar region (Figs.10–11): *Clitellum*: saddle-shaped, segmented, white; on 1/n11,12–20,21; ventral edges extend slightly below *cd* setae. *Tubercula pubertatis*: glandular oval pads; segmented, rimmed dorsally and ventrally; on 1/n16,17–20, dorsally bordering clitellum at *cd* setae. *Papillae*: glandular, moderate in size, paired, encircling *ab* setae on segments 10–12; on holotype additionally on 16 small blisters (Fig. 10); on two paratypes a pair of prominent, yellowish papillae on 18 (Fig. 11).

Internal characters:

Septa: 4/5 7/8 8/9 thickened moderately, slightly muscular, firm; 5/6 6/7 not thickened, although strong. *Gizzard*: globular, muscular, in 7. *Calciferous glands*: in 9, large, distinctly separated dorsally and ventrally. *Intestine*: commences in 12. *Typhlosole*: commences in 22, terminates in paratype in 56. *Dorsal blood vessel*: 5–8 partly separated, partly double; 9 enlarged, double, cordiform; in 10 and following segments enlarged, simple; crossing septa simple. *Paired dorsoventral vessels*: 5–8 thin vessels, 9–11 enlarged, moniliform. *Nephridia*: meganephridia; coiled loops with elongated caeca. *Spermiductal funnels*: proandric arrangement; one pair, free in 10. *Vasa deferentia*: single ducts commence at lateral parts of spermiductal funnels and run backwards at each side of body to posterior part of 16, where enter body wall, and probably into male pores. *Seminal vesicles*: one pair of large sacs in 11, commencing at septum 10/11. *Spermathecae*: in 9 and 10; different in size and shape; small ampullae with elongated necks on glandular basis, or simple, elongated ampullae. In 9 two pairs, located in unusual arrangement, i.e. in anterior and posterior parts of segment; anterior pair small, with its ectal ends entering body wall between ringlets of segment 9, with no confirmed connection with spermathecal pores; ectal parts of posterior pair located behind anterior pair, enter into intersegmental furrow 9/10. In segment 10 one pair with ectal parts entering into intersegmental furrow 10/11. No iridescence in spermathecae of both segments was observed; thick, white, mucus was found in three dissected thecae.

Ovaries: not observed. *Genital glands*: in holotype large, flat glands in 10, 12, 16; in paratype one pair of large, composite, round, flat glands in segment 18, associated with papillae of same segment.

Biological notes: The Royal Natal National Park, situated in the central Drakensberg mountain range, between altitude ranges from 1340–3048 m, has different geological formations and several habitat types (Pooley and Player 1995). The vegetation comprises grassland with short grasses and herbs, ferns, lichens and mosses, stream and river-bank woodland, sage-wood scrub, *Protea* savannah, bushes, and *Podocarpus*-dominated forests. A large part of the park has been under protection for nearly 50 years. The holotype was collected at the eastern side of the park, in a broad valley, covered with rocks, riverine bush and tall grasses. The paratypes were found outside the park nearly 28 km from the holotype locality, in primary grassland at much lower altitude.

Discussion: The locations of spermathecae in segments 9 and 10 suggest assignation to the *lesothoensis* species-group. Similar to *sani* and to *amphius* sp. n., having spermathecal ectal parts entering intra-segmental body wall. The presence of two distinct pairs of spermathecae in segment 9 distinguishes *oresbiosus* from other species of this group.

Distribution: Known from Drakensberg escarpment of western KZN (Fig. 7).

Proandricus bourquini Plisko, 1996

P*roandricus bourquini* Plisko, 1996*b*: 298.

Material examined: **KwaZulu-Natal**: Ncandu Forest Reserve (27°45'30"S:29°42'30"E): at *ca*. 1830 m, grassland plateau near Ulumbi River, from moist soil, NMSA/Olig.02357 29 January 1996, 1 juv, JDP; NMSA/Olig.02363 31 January 1996, 1 juv, JDP; NMSA/Olig.02343 on bank of Ulumbi River, from wet soil, 29 January 1996, 1 juv, JDP; NMSA/Olig.03489 Ncandu Forest (27°54'03"S:29°41'36"E) valley, grassland, 23 October 2001, 1 cl, AJA , PN.

Remarks: This species is known from the type locality and its close vicinity in foothills of Drakensberg mountain range in KZN (Fig. 7).

The *belli* species-group

To this group, characterized by spermathecal pores occurring only in two intersegmental furrows 11/12 and 12/13, and three variably thickened septa 4/5 7/8 8/9, are assigned: *belli* (Benham, 1892), *lovuus** sp. n., *beddardi*, hlatikulu** Plisko, 2002, *modestus**, setosus**, magdae* Plisko, 1993, *perolofi* Plisko, 1994, and *skeadi* Plisko, 1993.

Although the anatomical characters found in the species assigned to this group show similarity, their geographical distribution does not confirm a unity of the group. The species marked with one asterisk are known only from KZN: *lovuus* is known from the area of Richmond and Pietermaritzburg, *hlatikulu* and *beddardi* from limited number of sites in the north-eastern KZN. The species marked with two asterisks occur in KZN and also in the other provinces: *setosus* in the central and northern KZN and southern Mpumalanga; *modestus* is known from numerous sites of South Africa (see remarks under *P. modestus)*. It occurs in natural biotopes, and in agricultural fields into which it was probably introduced by humans.

No new material for *hlatikulu* has been collected since species description. The occurrence of species known from KZN is shown in Fig. 7.

P. belli, magdae, perolofi and *skeadi* are known only from the Eastern Cape province.

Proandricus lovuus sp. n.

(Figs 12–13)

Etymology: Named after the Lovu River on the bank of which the holotype was found.

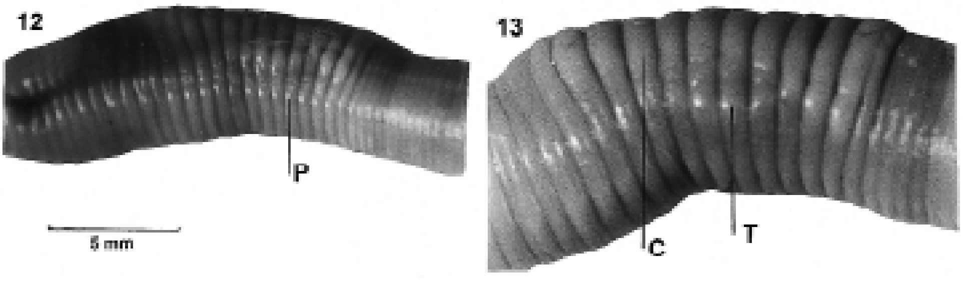
Material examined: **KwaZulu-Natal**: Holotype NMSA/Olig.00482 on the bank of Lovu River in Richmond (29°52'S:30°16'E) area, in moist soil, 7 December 1989, JDP. Paratypes: NMSA/Olig.03769, 6 cl and NMSA/Olig.03690, 1 cl, Pietermaritzburg, Scottsville (29°35'S:30°25'E) on bank of Umsindusi River near tennis court, in 1–15 cm of sandy soil, 8 January 1989, JDP. Other material: NMSA/Olig.00802, 25 cl + 34 juv collected in close neighbourhood of paratype locality, 8 January 1989, JDP.

Description based on holotype and paratypes.

External characters

General: cylindrical along the whole body length. *Colour*: alcohol-preserved yellowish-white. *Dimensions*: preserved holotype 74 mm long, 3 mm wide at 10, 4 mm in region of tubercula pubertatis; paratypes 55–79 mm long, 3–4 mm wide. *Segment number*: holotype 144, paratype 165–176. *Prostomium*: prolobous. *Segmentation*: secondary annulation present on preclitellar segments; 1 and 2 short, with no clear segmental separation, both with irregular longitudinal grooves; 3 simple, as long as 1 and 2; 4–8 with 2 ringlets, similar in size and appearance; 9 with 2 ringlets, first longer than second; 10–11 and clitellar simple; postclitellar short, simple. *Setae*: moderate in size, paired; first pairs on 3, subsequent pairs of 4–9 on first ringlet. Preclitellarly *aa* > *bc*, postclitellarly *ab* = *cd*. *Nephridial pores*: obvious, in *c* setal lines; first pair in intersegmental furrow 3/4. *Female pores*: not observed. *Male pores*: externally not observed; probably in 14/15 intersegmental furrow. *Spermathecal pores*: two in intersegmental furrows 11/12 and 12/13.

Clitellar region (Figs 12–13): *Clitellum*: on 11,12–21,22; saddle-shaped, segmented, whitish-grey; on 12–13 ventral edges extend to *d* setal lines, on 14–1/n19 to dorsal border of tubercula pubertatis; on 1/n19–21 extend below *cd* setae; on 11 only dorsally, thin layer of clitellar tissues. *Tubercula pubertatis*: on 1/n14,15–1/n19 below ventral



Figs 12–13. *Proandricus lovuus* sp. n. 12. Holotype, dorso-lateral view with row of small papillae. 13. Paratype, enlarged lateral side with tuberculum pubertatis. [C = clitellum, T = tuberculum pubertatis, P = papilla of segment 18].

clitellar edges; oval swellings with thin grooves at their ventral borders (Fig.13). *Papillae*: small swellings, paired, in *ab* setal lines on 10–22 (Fig. 12).

Internal characters

Septa: 4/5 most thickened; 7/8 and 8/9 thickened moderately; other septa thin. *Gizzard*: large, muscular. *Calciferous glands*: in 9; laterally, widely separated dorsally and ventrally. *Intestine*: commences in 12. *Typhlosole*: in holotype commences abruptly as thick U-shaped in 19; terminates in 126. *Dorsal blood vessel*: double in 5–7, close; 8 double, separated; 9 cordiform; 10 and following simple; simple when crossing septa. *Paired dorso-ventral vessels*: thin tubes in 4–8; 9–11 moniliform, not much enlarged. *Nephridia*: Meganephridia, paired small tufts of coiled tubules, with thin, elongated V-shaped caeca. *Spermiductal funnels*: proandric arrangement; one pair in 10, closely connected at septum 10/11 with vesiculae seminales. *Seminal vesicles*: one large pair commencing at septum 10/11, extending equally into 10 and 11. *Spermathecae*: one pair per segment; elongated ampullae, with short, thin necks; ectal parts enter body wall close to intersegmental furrows 11/12 and 12/13 respectively; posterior pair slightly larger than anterior, iridescent. *Vasa deferentia*: not observed, being not fully developed or deeply embedded in body wall. *Ovaries*: not observed. *Genital glands*: flat glands, in 14–18; partially associated with internal glands of tubercula pubertatis.

Biological notes: The holotype was collected in pasture on the bank of small stream. The paratypes were found at considerable distance from the type locality, on bank of the Umsindusi River. Degradation of both areas, and water pollution were in evidence.

Discussion: Three thickened septa and spermathecal pores in 11/12 and 12/13 suggest species assignation to the *belli* species-group, although septum 4/5 is not thickened as much as is observed in the other species of this group. *P. lovuus* resembles the similarly sized *setosus*. Both species have spermathecae matching in shape. They differ notably in the shape and location of the seminal vesicles, commencement and extension of typhlosole. The moderate size of setae in *lovuus* also distinguishes it from *setosus*.

Distribution: The species is known only from two sites, both in Pietermaritzburg area (Fig. 7).

Proandricus beddardi (Benham, 1886)

Microchaetus beddardi Benham, 1886*b*: 78; Benham 1892: 142; Beddard, 1895: 672; Michaelsen 1900: 449, 1918: 327; Reynolds & Cook, 1976: 7.
Proandricus beddardi; Plisko, 1992: 357.

Material examined: **KwaZulu-Natal**: NMSA/Olig.03658 Hluhluwe Game Reserve, Mbombe Forest (28º03'15"S:32º03'12"E) at 484 m, in forest valley, slightly damp sandy-clay, next to water-seep, 30 September 2002, 4 cl + 4 juv, AJA, DG [associated with *Microchaetus quaerus* sp.n.]

Remarks: The type locality was broadly indicated as ‘Natal’. Collected by Plisko (1992) from a few sites in north-eastern KZN. Present records confirm species occurrence in close neighbourhood of the earlier recorded sites (Fig. 7).

Proandricus modestus (Michaelsen, 1899)

Microchaeta modesta Michaelsen, 1899*a*: 109; Ude 1905: 495; Reynolds & Cook 1976: 139.
Microchaetus modestus; Michaelsen 1900: 449; Ljungström & Reinecke 1969: 217; Reinecke & Ljungström 1969: 217; Reinecke& Ryke 1970*a*: 8, 1970*b*: 1, 1972*a*: 3, 1972*b*: 1, 1974: 333; Reinecke 1983: 199.
Microchaetus modestus f. typica Michaelsen, 1912: 85; Michaelsen 1918: 328.
Microchaetus modestus var. typica Michaelsen, 1913*a*: 542.
Proandricus modestus; Plisko 1992: 355, 2000*b*: 240.

Remarks: This species belongs to a small microchaetid group distributed in several provinces of South Africa (Tables 1–3). It was recorded from the Northern Cape, North West, Mpumalanga, KZN and Eastern Cape provinces. Collected from natural biotopes and also from agricultural fields (Ude 1905, Ljungström & Reinecke 1969, Reinecke 1983, Reinecke & Ryke 1970*a b* 1972*a b* 1974, Plisko 2000*b*). Its broad distribution probably results from agricultural practices, possible adaptation to disturbed habitats, and an ability to survive under different temperatures (Reinecke & Ryke 1974, Plisko 2000*b*). This is the only species of the genus that ranges far to the west of the country. In KZN it was recorded in a roadside bank near an agricultural field (Fig. 7).

Proandricus setosus Plisko, 1996

Proandricus setosus Plisko, 1996*b*: 303; Plisko 2000*b*: 241.

Material examined: **KwaZulu-Natal**: NMSA/Olig.01779 33 km north-west of Pongola (27º20'S:31º30'E) on the side of the road 27 November 1993, 5 cl + 2 juv, JDP, TL, DMc. NMSA/Olig.02390 25 km west of Pongola, grassland near road 27 November 1993, 3 cl + 2 juv JDP, TL. NMSA/Olig.02075 Pongola Bush Nature Reserve (27º25'S:31º02'E) at the border of bush and grassland 19 January 1995, 2 cl + 1 juv, JDP, BRS, B. Howells. Ithala Game Reserve, collected by JDP, TL, DMc: Along Mhladeni Road (27º32'S:31º15'E–27º33'S:31º20'E) 30 November 1993: NMSA/Olig.01802 at *ca*. 680 m near small dam from moist soil, 8 cl; NMSA/Olig.01806, 8 cl + 5 juv; NMSA/Olig.01808 at *ca*. 780 m from grassland rocky soil, 5 cl + 3 juv; NMSA/Olig.01810 at *ca*. 700 m from grassland rocky soil, 1 cl + 1 juv. NMSA/Olig.01827 at the side entrance to Reserve (27º32'S:31º23'E) 4 cl + 1 juv. NMSA/Olig.01737 near Craig Adam (27º33'S:31º23'E) at *ca*. 800 m on bank of stream flowing to Vumangve River 24 November 1993, 12 cl + 3 juv, and NMSA/Olig.01742 between stones from moist soil, 1 cl + 1 juv. NMSA/02297 40 km north of Vryheid (27º46'S:30º50'E) near road to Melmoth from grassland moist soil 16 December 1995, 1 cl + 2 juv. NMSA/Olig.01043 Ngome Forest (27º52'S:31º24'E) on the side of the road 4 December 1990, 1 cl, JDP, BRS.

Remarks: Variability in external and internal characters was observed in several individuals. Clitellum shorter than described for the type material, covering only segments 12–21, occurred in specimen collected in Ngome. Various thicknesses of setae were noticeable in many sympatric individuals. One pair of spermathecae per segment, located in 11 and 12, as was stated in the type descriptions (Plisko 1996*a*), was observed in many dissected individuals. However, in some specimens the additional one spermatheca in segment 12, or two pairs in 11 and 12 were observed. Modest differences in the shape of spermathecae were also noticeable.

The species, described from Kranskop situated in central KZN, has been recorded from numerous sites in the northern part of this province (Fig. 7), and also from Drakensberg range in Mpumalanga.

The *colletti* species-group

To this group, characterised by spermathecal pores occurring in two intersegmental furrows 11/12 and 12/13, and with only two septa 7/8 8/9 thickened, are assigned: *colletti** (Beddard, 1907), *adriani**, *babanango**, *bergvillensis**, *entumeni**, *gracilis**, *jasoni**, *ortyi**, *thornvillensis**, *bulwerensis** Plisko, 1992, *hedothecus** Plisko, 2000, *injasuti** Plisko, 2002, *ivari** (Michaelsen, 1907), *martensi** Plisko, 2002, *michelleae** Plisko, 2002, *richerti** Plisko, 2002, *comptus* Plisko, 1996, *dwesa* Plisko, 2002. The species marked with one asterisk were recorded from KZN. *P. comptus* is known from the northern extension of the Drakensberg in Mpumalanga; *dwesa* from Eastern Cape, south of KZN.

New data are recorded for *adriani*, *babanango*, *bergvillensis*, *entumeni*, *gracilis*, *jasoni*, *ortyi* and *thornvillensis*. No new data are presently available for: *colletti* known from north-eastern KZN, *bulwerensis* known from Ixopo area, *hedothecus* occurring in the northern KZN, *injasuti* collected in the Giant's Castle Game Reserve, *ivari* known from central KZN, *martensi* and *michelleae* recorded from the Drakensberg Gardens, and *richerti* known only from Vergelegen Nature Reserve.

Species distribution in KZN is shown in Fig. 7.

Proandricus adriani Plisko, 2000

Proandricus adriani Plisko, 2000*b*: 243.

Material examined: **KwaZulu-Natal**: NMSA/Olig.03337 Blinkwater Nature Reserve (29º14'03"S:30º27'36"E), in valley, clay soil, 18 January 2001, 1 cl + 1 juv; NMSA/Olig.03490 The Swamp Nature Reserve (29º46'15"S:29º37'15"E) at edge of vlei above water, from wet soil and roots, 22 October 2001, 6 cl + 2 juv and NMSA/Olig.03491, 7 cocoons. All collected by AJA.

Remarks: The species is known from three considerably separated sites in the eastern outskirts of the Drakensberg mountain range (Fig. 7), all protected by KZN Wildlife

Proandricus babanango Plisko, 1992

Proandricus babanango Plisko, 1992: 355; Plisko 2000*b*: 245; Reynolds & Cook 1993: 12.

Material examined: **KwaZulu-Natal**: Nkandla Forest Reserve (28º42'44"S:31º08'39"E) at 1204 m, east-facing slope, grassland burnt 3 years ago, at 30 cm depth, NMSA/Olig.03530, 1 cl, and NMSA/Olig.03531, 20 juv; all collected 21 November 2001 by AJA, HM.

Remarks: The species has been described from Babanango situated in northern KZN (Fig. 7). The subsequent records (Plisko 2000*b*) and present data suggest that this species may range into the central part of the province. In the presently noted site it was associated with a juvenile *Tritogenia*, and an acanthodrilid of the genus *Udeina*.

Proandricus bergvillensis Plisko, 2000

Proandricus bergvillensis Plisko, 2000*b*: 246.

Material examined: **KwaZulu-Natal**: Highmoor State Forest: NMSA/Olig.03368 and NMSA/Olig.03370 indigenous grassland with parts of vlei under soaked soil (29º18'33"S:29º35'55"E) 4 cl + 4 juv + 1 cocoon; NMSA/Olig.03375 *ca*. 30 m from previous sample, along track, from under water in vlei, 1 cl; NMSA/Olig.03374 indigenous forest (29º18'35"S:29º35'44"E) from moist soil, 1 cl + 30 juv. All collected 14 March 2001 by JDP, AJA, PN.

Remarks: The species has been described from the neighbourhood of Bergville. Present records extend the known range of the species along the foothills of the Drakensberg escarpment southwards. Most specimens collected in the late summer were in quiescent phase. In presently studied individuals a backward extension of one or both seminal vesicles into three to five segments was observed. Collection sites in KZN are shown in Fig. 7.

Proandricus entumeni Plisko, 1992

Proandricus entumeni Plisko, 1992: 360; Reynolds & Cook 1993: 14; Plisko 2000*b*: 250.

Material examined: **KwaZulu-Natal**: Qudeni Forest Reserve (28º39'40"S:30º47'53"E) valley, short grassland, from top soil: NMSA/Olig.03438 1 cl; NMSA/Olig.03439, 1 with slightly developed clitellum and tubercula pubertatis + 1 abscised juv; all collected 11 April 2001 by AJA and PN. Ngoye Forest Reserve (28º49'53"S:31º44'23"E) at *ca*. 377 m, forest, next to tract, near surface 3–5 cm among roots of various plants, NMSA/Olig.03543 5 cl + 5 juv, (one with regenerated postclitellar segments), 15 January 2002, AJA, HM.

Remarks: The species is known mainly from indigenous forests, bushes and grasslands protected by KZN Wildlife. Occasionally was collected at the edges of the natural biotopes transformed recently into agricultural fields. Collection sites are shown in Fig. 7.

Proandricus gracilis (Michaelsen, 1907)

Microchaetus gracilis Michaelsen, 1907: 8; Michaelsen 1913*c*: 443, 1918: 330; Reynolds & Cook 1976:108.
Proandricus gracilis; Plisko 1992: 362, 2000*b*: 252.

Material examined: **KwaZulu-Natal**: Wagendrift Nature Reserve: NMSA/Olig.03354 (29º02'31"S:29º50'13"E) in top layers of soil and among grass roots in summit grassland, 27 February 2001, 12 juv, [2 with tubercula pubertatis and slightly marked clitellum] AJA, PN; NMSA/Olig.03451 (29º02'32"S:29º50'15"E) in top layer of soil above rocks, medium-high grass and small shrubs, 4 May 2001, 14 cl, AJA, BK. Eastwolds (30º00'S:29º55'E) area, *ca*. 30 km north-west of Ixpopo along the road to Bulwer, from fallow ground: NMSA/Olig.00720, 1 mature, autotomised into 4 pieces; NMSA/Olig.00730, 12 cl abscised anterior parts + 10 juv + 10 abscised juv; all collected 29 January 1991 by JDP; *ca*. 25 km north-west of Ixopo along the road to Bulwer, from ditch near road, NMSA/Olig.00657, 1 with partly absorbed clitellum and tubercula pubertatis, in quiescent phase, 5 June 1990, JDP, A. Zicsi.

Remarks:The species is related to *ivari* and *jasoni*. Recently studied material differs slightly from the type descriptions. The variations were observed in the shape of clitellum, number and position of papillae and in the shape of genital glands. Collection sites are shown in Fig. 7.

Proandricus jasoni Plisko, 1992

Proandricus jasoni Plisko, 1992: 362; Reynolds & Cook 1993:16.

Material examined: **KwaZulu-Natal**: 2 km north-west of Estcourt (29º05'S:29º54'E) grassland, moist soil, 12 May 1993, JDP and I. Pajor: NMSA/Olig.01894, 1 cl + 3 juv + 3 abscised short anterior parts + 3 abscised posterior parts; NMSA/Olig.01895 and

NMSA/Olig.01896, 4 cocoons and 2 juvenile individuals coming out of cocoon; NMSA/Olig.01897, 1 juvenile autotomised into two parts. 5 km north of Mooi River (29º12'S:30º01'E), primary grassland, moist soil, 5 December 1996, JDP, TL: NMSA/Olig.02447 and NMSA/Olig.02451, 1 cl + 13 juv, JDP, TL.

Remarks: The species is related to *gracilis* and *ivari*, sympatric with them. Present sites confirm species occurrence in the extended area of a neighbourhood of the type locality. Collection sites are shown in Fig. 7.

Proandricus ortyi Plisko, 2000

Proandricus ortyi Plisko, 2000*b*: 254.

Material examined: **KwaZulu-Natal**: Weenen Nature Reserve: NMSA/Olig.03183 Nyandu Camp, under tent (28º35'S:29º01'E) 1 cl, 30 September 2000; NMSA/Olig.03180 near main road, under rock in *Acacia* savannah burnt recently (28º51'40"S:30º03'06"E) 1 cl, 26 September 2000; both samples collected by R. Slotow. Otto's Bluff, Wattle Grove (29º28'30"S:30º22'12"E) from wet soil under indigenous grassland, NMSA/Olig.03379, 1 with tubercula pubertatis, abscised posteriorly + 3 juv, + posterior part, 12 January 2001, JDP, AJA , TN.

Remarks: The species is known from the upper Thukela River Valley and from its neighbouring area in central KZN (Fig. 7).

Proandricus thornvillensis Plisko, 1992

Proandricus thornvillensis Plisko, 1992: 364; Plisko 2000*b*: 257; Reynolds & Cook 1993: 21.

Material examined: **KwaZulu-Natal**: NMSA/Olig.03443 Midmar Nature Reserve (29º31'56"S:30º11'15"E) grassland, medium tall grass, 2 cl, and NMSA/Olig.03444, 13 juv, 25 April 2001, AJA and BK; NMSA/Olig.03201 Camperdown (29º43'S:30º32'E) Umlaas Road, garden soil, 19 January 2000, 1 cl abscised postclitellarly, H. Deane; NMSA/Olig.00864 Thornville (29º44'S:30º24'E) on bank of local stream, 27 November 1989, 7 juv, JDP.

Remarks: The species has been recorded from several scattered sites in the area of Pietermaritzburg (Plisko 1992). It occurs in grasslands, river-banks, riverine bush, always preferring undisturbed habitats. Only once was it recorded from the soil of recently transformed primary grassland into the ornamental garden.

The *marleyi* species-group

To this group, characterised by spermathecal pores occurring in only two intersegmental furrows 11/12 and 12/13, and with variably thickened four septa 4/5 5/6 6/7 7/8, or with three septa 5/6 7/8 8/9 thickened, are assigned three species: *marleyi* Michaelsen, 1928, *alatus* Plisko, 1996, and *armstrongi* Plisko, 2002.

P. marleyi and *alatus* were collected in Melmoth area. *P. armstrongi* is known from the Mount Currie Nature Reserve, being an extension of the south-eastern Drakensberg foothills. No new material for all three species is presently available. Species distribution in KZN is shown in Fig. 7.

Tritogenia Kinberg, 1867

Tritogenia Kinberg, 1867: 97.

Type species: *Tritogenia sulcata* Kinberg, 1867 by monotypy. Type depository: Naturhistoriska Riksmuseet, Stockholm, Sweden.

Thirty six species known from South Africa (Table 3), one species of uncertain taxonomic status and geographical origin; 31 recorded from KZN, 27 endemic for KZN. Five species-groups, all known from KZN.

Species distribution in KZN is shown in Fig. 14.

Holandric, with one oesophageal gizzard in the area of 6–7, and more than one pair of nephridia per segment.

Three new species: *debbieae*, *hiltonia* and *qudeni* in the *sulcata* species-group are described. The new *tetrata* species-group is established for *T. tetrata*. New data for lately studied species are added in the appropriate species groups.

TABLE 3.

The distribution of *Tritogenia* species.

Species marked with one asterisk are endemic to KwaZulu-Natal; those marked with two asterisks occur in KZN but have broader distributions as indicated. Those without an asterisk have not been recorded from KZN but occur in the provinces indicated.

*alveata**
*annetteae**
*ataxia*** = Mpumalanga
*benhami**
*crassa**
*curiosa**
*curta**
*debbieae**
*diversa**
*douglasi**
grisea = Free State, North West, Mpumalanga, Gauteng
*herbana*** = Mpumalanga
*hiltonia**
*howickiana**
*insolita**
*karkloofia**
*koilia**
kruegeri = Mpumalanga, Limpopo
*liversagei*** = Mpumalanga
*lunata**
*melmothana**
*miniseta**
*monosticha**
*morosa**
*mucosa**
*ngelensis**
*ngomensis**
palusicola = Limpopo
*qudeni**
*shawi**
silvicola = Limpopo
*soleata**
*sulcata**
*tetrata**
turneri = Limpopo
*zuluensis**

The *grisea* species-group

Characterised by the occurrence of spermathecal pores in only one intersegmental furrow 12/13 (or 11/12? in *benhami*). To this group are assigned: *grisea* (Michaelsen, 1902), *ngomensis**, *monosticha**, *benhami* (Michaelsen, 1900), *kruegeri*. Species marked with one asterisk are known from KZN. *T. monosticha* Plisko, 1997 has been described on the single specimen from Melmoth (Fig. 14), and no new material is presently available. For *grisea, ngomensis* and *kruegeri* new data are provided. The taxonomic position of *benhami* cannot be positively established due to an inadequate description and missing type material (Reynolds & Cook 1976). Although the type locality has been given as 'Natal' [presently known KZN], no new material has been collected in this province since the original description.

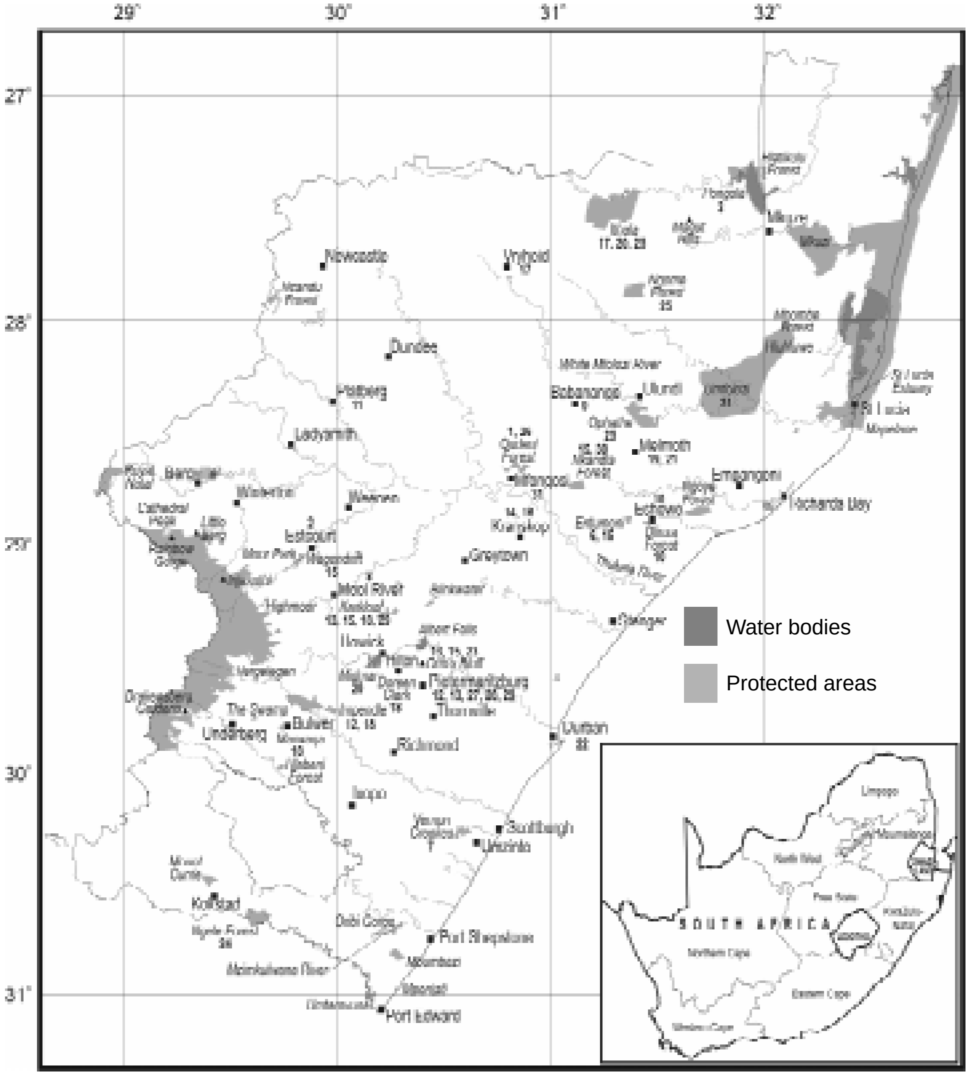


Fig. 14. The distribution of *Tritogenia* species in KZN. 1 = *alveata*; 2 = *annetteae*; 3 = *ataxia*; 4 = *benhami*; 5 = *crassa*; 6 = *curiosa*; 7 = *curta*; 8 = *debbieae*; 9 = *diversa*; 10 = *douglasi*; 11 = *herbana*; 12 = *hiltonia*; 13 = *howickiana*; 14 = *insolita*; 15 = *karkloofia*; 16 = *koilia*; 17 = *liversagei*; 18 = *lunata*; 19 = *melmothana*; 20 = *miniseta*; 21 = *monosticha*; 22 = *morosa*; 23 = *mucosa*; 24 = *ngelensis*; 25 = *ngomensis*; 26 = *qudeni*; 27 = *shawi*; 28 = *soleata*; 29 = *sulcata*; 30 = *tetrata*; 31 = *zuluensis*.

Tritogenia grisea (Michaelsen 1902)

Microchaetus griseus Michaelsen, 1902: 33; Michaelsen 1912: 85, 1918: 307; Reynolds & Cook 1976: 109.
Tritogenia grisea; Plisko & Zicsi 1991: 121; Plisko 1997: 280.

Material examined: **North West**: NMSA/Olig.01302 Skandinavia Drift (26º56'S:27º03'E) on bank of Vaal River, under bridge, in sandy wet soil, 12 November 1992, 3 cl, JDP. NMSA/Olig.01304 Parys (26º54'S: 27º57'E) on bank of Vaal River, in dry soil, 14 November 1974, 3 cl + 15 juv, JDP. **Gauteng**: NMSA/Olig.02500 Brits (25°38'S:27°47'E) cultivated field, 18 February 1997, 2 cl, W. J., Meyer. Pretoria North (24°32'S:30°24'E) on the bank of Bon Accord Dam, in soaked soil, 20 November 1974: NMSA/Olig.02168, 11 cl + 28 juv; NMSA/Olig.02170, 4 cl + 25 juv; NMSA/Olig.02171, 7 cl + 23 juv; all collected by JDP. NMSA/Olig.02176 Groenpont Gevangenis near Vereeniging (26°40'S:27°56'E) cultivated field, 2 cl, W. J. Meyer. **Mpumalanga**: NMSA/Olig.02663 Witbank (25°52'S:29°15'E) on bank of Klipspruit, in moist soil, 23 November 1997, 2 cl + 1 juv, I. Meyer. NMSA/Olig.02401 26 km north of Lydenburg (25°06'S:30°28'E) in savannah dry soil, 29 November 1996, 7 cl + 2 juv, JDP, TL.

Remarks: This species has been known from Free State and North West provinces (Michaelsen 1902 1912 1918, Plisko & Zicsi 1991). Recent data confirm species presence in North West and extends the known range into Gauteng and Mpumalanga provinces. In KZN this species was not found.

Tritogenia kruegeri Plisko & Zicsi, 1991

Tritogenia kruegeri Plisko & Zicsi, 1991: 121. Reynolds & Cook 1993: 17.

Material examined: **Mpumalanga**: Kruger National Park, Crocodile Bridge (25°21'S:31°54'E) under Wild Fig tree: NMSA/Olig.01708, 1 cl, NMSA/Olig.01709, 1 cl, NMSA/Olig.01722, 1 cl, NMSA/Olig.01723, 1 cl, all collected 3–13 February 1976 by A. J. Reinecke. NMSA/Olig.02207, 7 km north of Amersfoort (27°00'S:29°51'E) on bank of swamp, in moist soil, 5 December 1995, 4 cl + 10 juv, JDP, TL. NMSA/Olig.02211 Genezareth Camp near Lake Chrissie (26°18'S:30°13'E) in moist soil, fallow ground near lake, 5 December 1995, 2 cl + 2 juv, JDP, TL. NMSA/Olig.02288 Sabie (25°02'S:30°58'E) area, near Thalalanati hotel, grassland, moist soil, 5 cl + 2 juv, JDP, TL. **Limpopo**: NMSA/Olig.02273 Louis Trichardt (23°01'S:29°56'E) area, near Clouds End, grassland, dry soil, 3 cl + 5 juv, 11 December 1995, JDP, TL.

Remarks: This species is known from grassland habitats in Limpopo province, forested areas, riverbanks and swamps in Mpumalanga province. Not collected in KZN.

Tritogenia ngomensis Plisko, 1992

Tritogenia ngomensis Plisko, 1992: 370; Reynolds & Cook 1993: 18.

Material examined: **KwaZulu-Natal**: NMSA/Olig.03419 Ophathe Game Reserve (28°26'28"S:31°24'09"E) hillside, grassland, between roots of grasses and various plants, 9 April 2001, 3 cl + 7 juv, AJA, PN.

Remarks: The species has been described from Ngome mistbelt forest. Current material was found southwards of the type locality. In recent individuals the clitellum was longer than observed in the type material on segments 13–22, but was extended over segments 13–1/n23, 24.

The *sulcata* species-group

To this group, characterised by spermathecal pores occurring in two intersegmental furrows 10/11 and 11/12, or 11/12 and 12/13, or 12/13 and 13/14, are assigned: *sulcata** Kinberg, 1867, *debbieae** sp. n., *hiltonia** sp. n., *qudeni** sp. n., *annettae** Plisko, 1997, *curiosa** Plisko, 1997, *curta** Plisko & Zicsi, 1991, *diversa** Plisko, 1997, *douglasi*, howickiana*, karkloofia*, lunata*, miniseta** Plisko, 1997, *ngelensis** Plisko, 1997, *shawi*, soleata** Plisko, 1997, *ataxia*** Plisko, 1997, *herbana*** Plisko, 1997, and *palusicola*** Plisko, 1997. Most of the species, all marked with one asterisk, occur in KZN (Fig. 14), although always in small areas. *T. ataxia*, *herbana* and *palusicola*, marked with two asterisks, occur in KZN and in neighbouring province Mpumalanga.

For *douglasi, herbana, howickiana, karkloofia, lunata, shawi,* and *sulcata* new data are provided. No new material available for *annetteae, curiosa, curta, diversa, miniseta, ngelensis, soleata*.

Tritogenia debbieae sp. n.

(Fig. 15)

Etymology: This species is named for Mrs Debbie Jennings, the Collection Manager at the Natal Museum, in appreciation for her extended friendly help.

Material examined: **KwaZulu-Natal**: Holotype NMSA/Olig.02448 Mooi River (29º12'S:30º01'E) primary grassland near Road M3, from moist soil between grass-roots, 5 December 1996, JDP, TL. Paratypes: NMSA/Olig.02449, 3 cl + 6 juv, collected with holotype.

Description based on holotype and paratypes.

External characters:

General: body cylindrical, compact after preservation. *Colour*: grey in life, preserved in formalin whitish-grey. *Dimensions*: preserved and contracted holotype 48 mm long, 4 mm wide at 10, 5 mm at tubercula pubertatis; paratypes 58–60 mm long, 4–6 mm wide. *Segment number*: holotype 73; paratype 94. *Prostomium*: prolobous, clearly separated from first segment. *Segmentation*: secondary annulation present on preclitellar segments in holotype and paratypes; 1–3 simple, with irregular longitudinal grooves; 4–9 with 2 simple ringlets, similar in size and appearance; 10, clitellar and postclitellar segments simple. *Setae*: minuscule, closely paired, preclitellarly only *ab* noted, postclitellarly not observed. *Nephridial pores*: not observed. *Female pores*: paired, minute openings in anterior part of 14 in front of *ab* setae. *Male pores*: in intersegmental furrow 18/19. *Spermathecal pores*: not observed externally; during dissection noted close to intersegmental furrows 11/12 and 12/13.

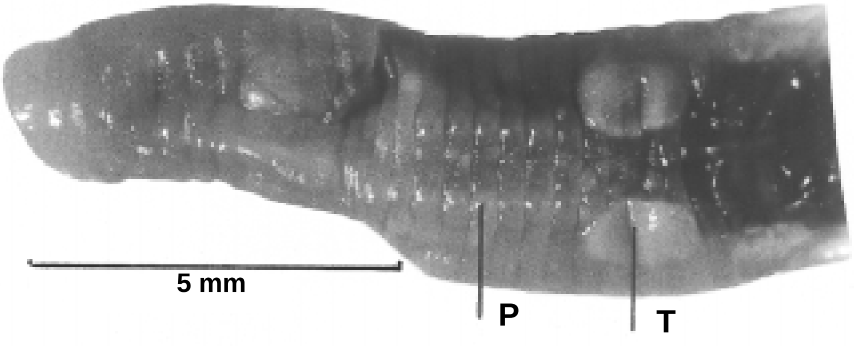


Fig. 15. *Tritogenia debbieae* sp. n., holotype, ventral view with tubercula pubertatis and row of papillae. [P = papilla of segment 14, T = tuberculum pubertatis].

Clitellar region (Fig. 15): *Clitellum*: not well developed, with thin layer of clitellar tissues; saddle-shaped, segmented, whitish-grey; holotype 13–23; on 13–17 clitellar tissues cover segments dorsally extending only to dorsal edges of tubercula pubertatis. *Tubercula pubertatis*: on 18,1/n18–1/n22, below ventral edges of clitellum; oval glandular pads, randomly grooved by irregular shallow furrows; ventrally widely separated. *Papillae*: on 10–18 paired or single, round swellings encircling *ab* setae, different sizes.

Internal characters:

Septa: 4/5–7/8 thin; other septa in preclitellar segments also thin. *Gizzard*: large, muscular, in 6–7; commencing abruptly in part of segment 6, extends and occupies whole of 7, terminating at septum 7/8. *Calciferous glands*: in 9–10, large, dorsolateraly; ventrally separated widely, dorsally by narrow groove. *Intestine*: commences in 13. *Typhlosole*: commences in 17 (or 18?), slim, V-shaped, gradually enlarging into U-shaped; terminates in 50. *Dorsal blood vessel*: double in 4–11; 10–11 enlarged; double when crossing septa 4/5–10/11; in following segments simple. *Paired dorsoventral commissural vessels*: 4–8 thin, gradually enlarging; 9–11 thick, moniliform. *Nephridia*: two pairs per segment; small serpentine loops, one pair ventrally, second pair dorsally. *Spermiductal funnels*: holandric arrangement; two pairs of large, iridescent funnels in 10 and 11 respectively; in holotype right sided sacs slightly smaller than left sided; each pair enclosed in separated sac, connected with vesiculae seminales at septa 10/11 and 11/12 respectively. *Seminal vesicles*: two pairs of small sacs, linked with testis sacs; in 10 and 11 respectively; posterior pair slightly extending into 12. *Spermathecae*: in clitellate holotype paired; large, spherical with short neck; ectal parts entering intersegmental furrows 11/12 and 12/13 respectively. In aclitellate paratype with well-developed tubercula pubertatis three spermathecae per segment: 1 at left side, 2 at right side; all globular, different size, iridescent. *Ovaries*: not observed. *Genital glands*: in holotype, in some of segments associated with papillae, only at left side of the body, flat, glandular, round structures; in paratype glands not observed.

Biological notes: The species was collected in grassland between the roots of tall grasses. Clitellate, aclitellate and juvenile individuals in different states of development were found in moist soil in the middle of summer. Iridescent sperm in spermathecae was observed in the clitellate individuals and in those with no clitellum. The species was associated with abundant *Microchaetus parvus* and *Microchaetus natalensis*.

Distribution: Known only from the type locality, located north-west of Pietermaritzburg (Fig. 14).

Discussion: Having spermathecal pores in two intersegmental furrows 11/12 and 12/13, *debbieae* is assigned to the *sulcata* species-group. Lacking thickened septa in preclitellar segments, this species evidently differs from the other congeners.

Tritogenia hiltonia sp.n.

(Fig. 16)

Etymology: Named after the name of the type locality, Hilton.

Material examined: **KwaZulu-Natal**: Holotype NMSA/Olig.03534 Hilton College (29º30'48"S: 30º18'03"E) at 1119 m, Mistbelt grassland, with many flowering herbs, collected 2–30 cm between roots of various plants, 13 December 2001, AJA, HM. Paratypes: NMSA/Olig.03644, 7 cl, collected together with holotype. Other material:

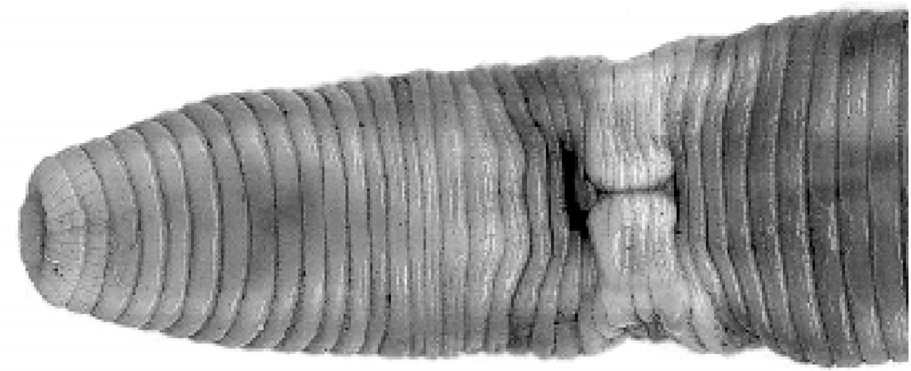


Fig. 16. *Tritogenia hiltonia* sp. n., holotype, anterior part of the body ventrally, showing secondary annulation of segments 4–9, and tubercula pubertatis.

NMSA/Olig.03645, 12 juv and NMSA/Olig.03646, 2 cocoons collected with holotype. Hilton College (29º30'47"S:30º18'02"E) at 1109 m, medium-tall grassland with many herbs, dry soil, at *ca*. 30 cm, 22 January 2002: NMSA/Olig.03546, 1 cl and NMSA/Olig.03547, 4 juv. All material collected by AJA, HM. Cedara (29º32'S:30º17'E) experimental agricultural field, sample 1 and 2: NMSA/Olig.02856 and NMSA/Olig.02857, 1 juv and 2 semi-mature, 25 February 2000, R. J. Haynes.

Description based on holotype and paratypes.

External characters:
General: body cylindrical, compact after preservation. *Colour*: grey in life, preserved in formalin whitish-grey. *Dimensions*: preserved and contracted holotype 56 mm long, 4 mm wide at 10, 5 mm at tubercula pubertatis; clitellate paratypes 38–56 mm long, 4–6 mm wide; juvenile 28–40 mm long. *Segment number*: holotype 90; paratypes 70–97. *Prostomium*: prolobous, not clearly separated from first segment. *Segmentation*: secondary annulation present on preclitellar segments; 1–3 simple, with irregular longitudinal grooves; 4–8 with 2 simple ringlets, similar in size and appearance; 9 with 2 ringlets, second shorter than first; segment 10, clitellar and postclitellar simple. *Setae*: minuscule, closely paired, in irregular rows; in preclitellar segments difficult to trace; postclitellarly *ab* closely paired in slightly irregular, longitudinal rows, *cd* sporadically observed only in some segments. *Nephridial pores*: not observed. *Female pores*: paired, minute openings in anterior part of segment 14. *Male pores*: externally not observed; probably in intersegmental furrow 19/20, where are small swellings. *Spermathecal pores*: conspicuous externally in intersegmental furrows 11/12 and 12/13; one or two small pores with round swellings.

Clitellar region (Fig. 16): *Clitellum*: saddle-shaped, segmented, whitish-grey; on holotype on 13–23; on 13–17 clitellar tissues developed only dorsally; on 18–23 ventral edges extend to dorsal borders of tubercula pubertatis. *Tubercula pubertatis*: on 18–22 between ventral edges of clitellum and median line; nearly square glandular swellings, randomly grooved by irregular shallow furrows; ventrally on 21–22 separated medially by narrow triangle invagination; on 17 rounded single swelling above groove separating tubercula. *Papillae*: on 10–14, paired or single, round swellings around *ab* or *cd* setae.

Internal characters:

Septa: 4/5 little thickened, 5/6 6/7 thickened very much, muscular, similar in thickness and appearance; 7/8 8/9 thickened less than anterior; 9/10 aborted; other septa in preclitellar segments thin; in posterior segments slightly thicker. *Gizzard*: large, muscular, in 6; commencing abruptly at septum 5/6 extends and occupies whole of 6, terminating abruptly at septum 6/7. *Calciferous glands*: in 9–10, stalked; separated widely ventrally, dorsally by short distance. Stalks extend along the whole length of calciferous glands. *Intestine*: commences in 13. *Typhlosole*: commences in 16, slim, V-shaped; in following segments gradually enlarging, becoming square, medially furrowed; terminates in area of 54. *Dorsal blood vessel*: double in 4–11; double when crossing septa 4/5–10/11; in 12 slightly enlarged, simple; in following segments simple. *Paired dorsoventral commissural vessels*: 4–8 thin, gradually enlarging; 9–11 thick, moniliform. *Nephridia*: in posterior segments two pairs; ventral pairs close to median body line, second pairs dorsally. *Spermiductal funnels*: holandric arrangement; two pairs similar in size and appearance, in 10 and 11 respectively; each pair enclosed in separate sac connected with vesiculae seminales; in dissected holotype sperm was observed in all funnels. *Seminal vesicles*: two pairs of small sacs in 10 and 11 respectively; one pair per segment, each linked with testis sacs at septa 10/11 and 11/12 respectively. *Spermathecae*: in 12 and 13, iridescent; 1–2 at each side; irregular in shape, thin, elongated with slightly enlarged ampullae; close to genital glands 12 and 13. *Ovaries*: paired, in 13, large, funnel-like. *Genital glands*: paired; in 12–15 small, flat, round; in 21 finger-shaped, elongated, 3–4 branched.

Biological notes: Found between roots of various plants at depth 2–30 cm. Several individuals at different stages of development and two cocoons were present in the same sample. Sperm observed in the spermiductal funnels and spermathecae confirm breeding activity during summer.

Distribution: Known only from the type locality in the area of Pietermaritzburg (Fig. 14).

Discussion: The species belongs to the *sulcata* species-group having spermathecal pores in two intersegmental furrows 11/12 and 12/13. Similar to *sulcata* but distinguished by the position and shape of tubercula pubertatis, the number and position of genital papillae, and the arrangement of setae.

Tritogenia qudeni sp. n.

(Fig. 17)

Etymology: Named after the type locality, Qudeni Forest Reserve.

Material examined: **KwaZulu-Natal**: Holotype NMSA/Olig.03441 Qudeni Forest Reserve (28º39'40"S:30º47'53"E), valley, short grassland, from top soil, 11 April 2001, AJA, PN. Paratypes: NMSA/Olig.03647, 6 cl + 2 juv, collected with holotype; NMSA/Olig.03436 Qudeni Forest Reserve (28º39'42"S:30º47'53"E) hillside, short grassland in top soil, 11 April 2001, 2 with tubercula pubertatis, AJA, PN; NMSA/Olig.03434 Qudeni Forest Reserve (28º39'43"S:30º47'54"E) hillside, grassland, between roots, 11 April 2001, 2 with tubercula pubertatis, AJA, PN. Other material: NMSA/Olig.02093, 6 km south-east of Qudeni (28º38'S:30º52'E) near road, grassland, moist soil, 23 January

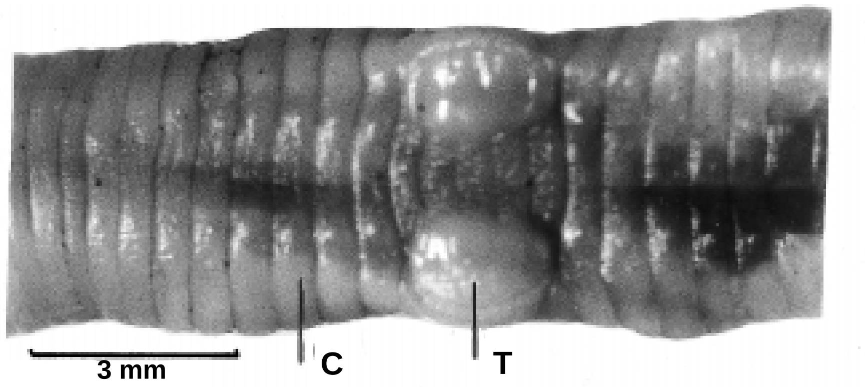


Fig. 17. *Tritogenia qudeni* sp. n., holotype, ventral side of clitellar region [C = clitellum, T = tuberculum pubertatis].

1995, 3 semi-mature with tubercula pubertatis + 8 juv, JDP, BRS.

Description based on holotype and paratypes.

External characters:

General: body cylindrical, compact after preservation. *Colour*: grey in life, preserved in formalin whitish-grey. *Dimensions*: preserved and contracted holotype 36 mm long, 3 mm wide at 10, 4 mm at tubercula pubertatis; clitellate paratypes 24–40 mm long, 3–4 mm wide; juvenile 14–18 mm long. *Segment number*: holotype 79, paratypes 80–84. *Prostomium*: prolobous, not clearly separated from first segment. *Segmentation*: secondary annulation present on preclitellar segments; 1–3 simple with irregular longitudinal grooves; 4–9 with 2 simple ringlets, second ringlet shorter than first; 10, clitellar and postclitellar simple. *Setae*: minuscule, closely paired; in preclitellar segments noted only *ab* on first ringlets of 4–9, and on 10–17; postclitellarly *ab* and *cd* observed sporadically. *Nephridial pores*: not observed. *Female pores*: externally not observed. *Male pores*: probably in intersegmental furrow 18/19 or in anterior part of segment 19, where are paired, small invaginations. *Spermathecal pores*: conspicuous, in intersegmental furrows 11/12 and 12/13, paired small invaginations with round swellings.

Clitellar region (Fig. 17): *Clitellum*: saddle-shaped, segmented, whitish-grey; on holotype on 13–23; 13–17 clitellar tissues extending to *ab* seta; on 18–23 ventral edges run parallel to borders of rims separating clitellum and tubercula pubertatis. On paratypes clitellar borders not clearly marked. *Tubercula pubertatis*: on 18–22, below clitellar rims, ventrally distantly separated (Fig. 17); oblong glandular swellings randomly grooved by irregular shallow furrows running parallel with intersegmental furrows; longitudinally with shallow furrows separating clitellar rims from glandular tubercula. *Papillae*: on 10–17, 23, paired, round swellings around *ab* setae.

Internal characters:

Septa: 4/5 5/6 6/7 thickened very much, muscular, similar in thickness and appearance; 7/8 8/9 thickened less than anterior; 9/10 aborted; other septa in preclitellar segments thin; in posterior segments slightly thicker. *Gizzard*: large, muscular, in 6–7; commencing abruptly at septum 5/6, extends and occupies whole of 6 and partly 7; septum 6/7 attached to gizzard in its middle portion, extending posteriorly, and ending with termination of gizzard. *Calciferous glands*: stalked, dorsal; in 9–10; separated widely ventrally, by very short distance dorsally; stalks extend through 9–10. *Intestine*: commences in 13. *Typhlosole*: commences gradually as thick, V-shaped in area of 20, enlarging increasingly into large tube, terminates in area of 48. *Dorsal blood vessel*: 4–11 double; double when crossing septa 4/5–10/11; 12 slightly enlarged, simple; in following segments simple. *Paired dorsoventral commissural vessels*: 4–8 thin, gradually enlarging; 9–11 thick, moniliform. *Nephridia*: two pairs: ventral pairs close to median body line, second pairs dorsally. *Spermiductal funnels*: holandric arrangement; iridescent, similar size and appearance in 10 and 11 respectively; each pair enclosed in mutual sac connected with seminal vesicles; in dissected holotype sperm was observed in all four funnels. *Seminal vesicles*: two pairs of small sacs, linked with testis sacs; in 10 and 11 respectively. *Spermathecae*: very small, thin, elongated; close to genital glands of 12 and 13. *Ovaries*: paired, in 13; large, funnel-like. *Genital glands*: paired, small, flat, round, in 12–15, associated with papillae.

Biological notes: Qudeni Forest Reserve, located almost at the northernmost limit of the midland mistbelt area, contains semi-coastal forest mixed with *Podocarpus* and other species of trees characteristic of afromontane forests, and also with grassland patches. The species was found between roots of various plants in topsoil, in the forest patches of grassland, and also in open grassland outside of the forest. Mature and juvenile specimens were collected together in early autumn. In some sites the species was associated with *alveata* and juvenile *Proandricus* sp.

Distribution: Known from the type locality and few sites in its close neighbourhood, all situated in central KZN (Fig. 14).

Discussion: The species belongs to the *sulcata* species-group having spermathecal pores in two intersegmental furrows 11/12 and 12/13. Similar to *ataxia*, but distinguished by the shape of tubercula pubertatis, the spermathecae, and the arrangement of setae.

Tritogenia douglasi Plisko, 1997

Tritogenia douglasi Plisko, 1997: 255; Plisko 2000*b*: 76.

Material examined: **KwaZulu-Natal**: Eshowe (28°50'S:31°28'E) area: NMSA/Olig.03161 Rockyridge Farm, under wattle trees, 15 March 2000, 1 juv; NMSA/Olig.03027 Rockyridge Farm, under pine tree, 19 April 2000, 1 juv; NMSA/Olig.03184 Mistyridge Farm, veld, 19 June 2000, 30 cl + 50 juv; all collected by TCD.

Remarks: Known from the Dlinza Forest Reserve and from its neighbouring fields recently incorporated into farming fields (Fig. 14).

Tritogenia herbana Plisko, 1997

Tritogenia herbana Plisko, 1997: 257.

Material examined: **KwaZulu-Natal**: NMSA/Olig.01251 Platberg (28°20'S:29°59'E) Elandslaagte, Mawelawela Game Farm (Mr G. Mitchell Innes Farm) grassland, 7 December 1992,1 cl + 4 semi-mature, JDP, BRS.

Remarks: The external and internal characters are in accord with the original description (Plisko, 1997), although the genital glands were observed only in segment 12, a variation possibly related to the degree of maturity. Known from KZN, and from the north-eastern Drakensberg escarpment in Mpumalanga province. Present record extends the known range of species into central KZN, and suggests much broader occurrence than is usually observed in the other species of this genus. The collection sites in KZN are shown in Fig. 14.

Tritogenia howickiana (Michaelsen, 1913)

Microchaetus sulcatus var. *howickianus* Michaelsen, 1913*c*: 432; Reynolds & Cook 1976: 115.
Tritogenia howickiana; Michaelsen 1918: 333; Plisko & Zicsi 1991: 112; Plisko 1992: 368, 1997: 280.

Material examined: **KwaZulu-Natal**: NMSA/Olig.02749 Howick (29º27'S:30º14'E) Amberfield, from garden soil, 15 May 1997, 4 cl, J. A. Pringle. NMSA/Olig.02330 Otto's Bluff, The Craig's Farm, on the bank of local stream, 6 December 1989, 1 cl + 5 juv, JDP.

Remarks: Known only from the type locality and its close vicinity (Fig. 14).

Tritogenia karkloofia Plisko & Zicsi, 1991

Tritogenia karkloofia Plisko & Zicsi, 1991: 115; Reynolds & Cook 1993: 16.

Material examined: **KwaZulu-Natal**: Nkandla State Forest, hillside, grassland, between roots of grasses and various plants: NMSA/Olig.03424 (28º44'35"S:31º08'57"E) 11 with tubercula pubertatis + 11 juv; NMSA/Olig.03423 (28º44'35"S:31º08'57"E) 2 juv; NMSA/Olig.03422 (28º44'35"S:31º08'57"E) 5 with tubercula pubertatis; all collected 10 April 2001 by AJA, PN. NMSA/Olig.02172 Entumeni Nature Reserve (28º53'S:31º19'E) indigenous forest, from the litter, 1 February 1989, 1 cl, JDP, BRS. NMSA/Olig.03355 Wagendrift Nature Reserve (29º02'31"S:29º50'13"E) from top layer of soil and among grass-roots in summit grassland, 27 February 2001, 6 cl, AJA, PN; NMSA/Olig.03454 Wagendrift Nature Reserve (29º02'32"S: 29º50'15"E) medium-high grass and small shrubs, in top layer of soil above rocks, 4 May 2001, 11 cl, AJA, BK; NMSA/Olig.03455 Wagendrift Nature Reserve (29º02'32"S:29º50'15"E) in top layer of soil above rocks, medium-high grass and small shrubs, 4 May 2001, 2 cl + 2 juv, AJA, BK; NMSA/Olig.00932 Karkloof Nature Reserve, Safari World (29º25'S:30º18'E) on bank of Umgeni River, at *ca*. 740 m, from sandy soil, 1 December 1988, 4 semi-mature + 4 juv, JDP; NMSA/Olig.00489 Karkloof Nature Reserve, Safari World (29º25'S:30º18'E) at *ca*. 800 m, on bank of Umgeni River, from moist, sandy soil, 4 January 1989, 10 cl + 14 juv, JDP; NMSA/Olig.00715 Karkloof Falls Nature Reserve, Safari World (29º25'S:30º18'E) primary grassland, 28 January 1991, 25 cl + 2 juv, JDP. NMSA/Olig.02334 Otto's Bluff (29º30'S:30º23'E) the Craig's Farm, on bank of local stream, 6 December 1989, 1 cl, JDP.

Remarks: Known from central KZN. The species was associated with *mucosa* in some collection sites(Fig. 14).

Tritogenia lunata Plisko, 1997

Tritogenia lunata Plisko, 1997: 259.

Material examined: **KwaZulu-Natal**: Karkloof Nature Reserve, Melmoth section: NMSA/Olig.03473 (29º16'51"S:30º16'52"E) hillside, rocky grassland, among mole-rat mounds, 9 October 2001, 2 cl + 7 juv; NMSA/Olig.03476 (29º16'57"S:30º16'33"E) hillside south-west, valley, grassland, collected on surface, 9 October 2001, 1 cl [larger than type material]; NMSA/Olig.03475 (29º17'00"S:30º16'31"E) valley above stream, grassland, 9 October 2001, 2 cl + 2 juv; NMSA/Olig.03477 (29º17'09"S:30º16'24"E) valley, edge of vlei, grassland, from peat soil, 10 October 2001, 1 cl; all collected by AJA, PN. Karkloof (29º18'S:30º13'E) Mr Geekie's Farm Benvie: NMSA/Olig.00235 at *ca*. 1260 m, forest edge of lower part of afromontane forest, collected under moss and between roots of various plants, on rocks and stones along stream, 22 February 1989, 1 aclitellate, JDP, BRS; NMSA/Olig.01004 at *ca*. 1260 m, mixed *Podocarpus* forest edge, lower part, from first 1–20 cm of moist soil, 20 December 1988, 5 cl + 21 juv, JDP, BRS; NMSA/Olig.00240 at *ca*.1250 m, on the side of road, on bank of muddy stream between roots in muddy black soil, 22 February 1989, 1 aclitellate, JDP, BRS; NMSA/OLIG.00247 at *ca*. 1260 m, higher part of afromontane forest edge, from litter and top soil, 22 February 1989, 2 with tubercula pubertatis + 7 juv, JDP, BRS. Doreen Clark Nature Reserve: NMSA/Olig.03322 (29º34'41"S:30º17'21"E) grassland, medium-tall grass, 15 January 2001, 1 not fully developed, AJA; from grassland with tall *Digiteria eviantha* (29º34'42"S:30º17'20"E) NMSA/Olig.03445 2 cl [much smaller than type material], and NMSA/Olig.03446 2 cl abscised, collected 25 April 2001 by AJA, BK. NMSA/Olig.03481 Marwaqa Nature Reserve (29°48'43"S:29°44'55"E) plateau, grassland, short thick grass, 15 October 2001, 2 cl, AJA, PN.

Remarks: Known from numerous sites in the Midlands of KZN (Fig. 14). Occurs in afromontane forests, patches of grassland, indigenous bush and forest, and in open primary grasslands. Variation in size was observed: there were mature individuals much larger or smaller than those known from the type locality. The species collected in the Doreen Clark Nature Reserve was associated with introduced megascolecid *Amynthas aeruginosus* (Kinberg, 1867).

Tritogenia shawi Plisko & Zicsi, 1991

Tritogenia shawi Plisko & Zicsi, 1991: 117; Plisko 1992: 371; Reynolds & Cook 1993: 20.

Material examined: **KwaZulu-Natal**: NMSA/Olig.02107 Pietermaritzburg (29º35'S:30º25'E) Bisley Park, under log in the picnic site bordered with *Acacia* bush, 22 December 1993, 1 cl, K. R. Cradock.

Remarks: Known only from the region of Pietermaritzburg (Fig. 14).

Tritogenia sulcata Kinberg, 1867

Tritogenia sulcata Kinberg, 1867: 97; Perrier 1886: 876; Michaelsen 1899*a*: 415, 1900: 453, 1918: 338; Reynolds & Cook 1976: 176; Plisko 1992: 373.
Megachaeta (Tritogenia) sulcata; Michaelsen 1891: 50.
Megachaeta? sulcata; Michaelsen 1891: 50.
Tritogenia sulcata [part.]; Michaelsen 1908: 31.
Microchaetus sulcatus f. typicus Michaelsen, 1913*c*: 431.
Tritogenia morosa Cognetti, 1906: 13; Michaelsen 1913*c*: 431, 1918: 338.
Microchaetus sulcatus; Reynolds & Cook 1976: 176.
Megachaeta sulcata; Reynolds & Cook 1976: 176.

Material examined: **KwaZulu-Natal**: NMSA/Olig.00467 on bank of Umgeni River (29º28'S:30º29'E) at crossroad to Safari World, after rain, from top layer of moist soil, 6 December 1989, 1 semi-mature + 5 juv, JDP. Pietermaritzburg (29º35'S:30º25'E) Town

Bush: NMSA/Olig.00688 from litter, 22 March 1988, 1 cl + 1 juv; NMSA/Olig.00968 Town Bush, at left side of the road leading to Government Nursery, from dry black soil, 12 October 1988 3 juv. NMSA/Olig.00908 Orient Park (30º31'S:30º13'E) near Midmar Dam, grassland, 31 January 1991, 22 cl + 34 aclitellate. All collected by JDP.

Remarks: The type locality was cited as Port Natal [now Durban]. The recent collection sites confirm species distribution in eastern and central KZN (Fig. 14).

The *mucosa* species-group

To this group, characterised by spermathecal pores occurring in three intersegmental furrows 10/11 11/12 12/13, or 11/12 12/13 13/14, or 13/14 14/15 15/16, are assigned: *mucosa** Plisko & Zicsi, 1991, *alveata**, *insolita** Plisko, 1997, *koilia** Plisko, 1997, *liversagei*** Plisko, 1997, *silvicola* Plisko, 1997, *turneri* Plisko, 1997.

Species marked with one asterisk are known only from KZN indigenous forests, grasslands and undisturbed areas. *T. liversagei* is known from northern KZN, and the Drakensberg mountain range in Mpumalanga, occuring in primary grassland, grassland utilised as pastures, and also in the soil under endemic *Acacia* trees. *T. silvicola* and *turneri* are known only from forested areas in northern Limpopo province.

New records are obtainable for *alveata*; no new material avaiable for *insolita, koilia, mucosa*, and *liversagei*.

Tritogenia alveata Plisko, 1997

Tritogenia alveata Plisko, 1997: 268.

Material examined: **KwaZulu-Natal**: Qudeni Forest Reserve: NMSA/Olig.03440 valley, short grassland from top soil (28º39'40"S:30º47'53"E) 2 cl; NMSA/Olig.03435 (28º39'42"S:30º47'53"E) hillside, short grassland from top soil, 1 cl; NMSA/Olig.03433 (28º39'42"S: 30º47'54"E) hillside, grassland between roots,1 cl; all collected 11 April 2001 by AJA, PN.

Remarks: Described and known from the Qudeni Forest Reserve and its close vicinity (Fig. 14).

The *tetrata* species-group

This newly proposed species-group is established for the species characterised by four rows of multiple spermathecae in segments 12–15, and spermathecal pores in intersegmental furrows 12/13 13/14 14/15 15/16. To date no other known *Tritogenia* species is characterised in this way.

Tritogenia tetrata sp. n.

(Fig. 18)

Etymology: G. *tetra* = four. Refers to the arrangement of spermathecal pores in four intersegmental furrows.

Material examined: **KwaZulu-Natal**: Holotype NMSA/Olig.03528 Nkandla Forest Reserve (28º42'59"S:31º08'05"E) at 1178 m of forest edge, under recently burnt short grass, between roots of various plants, 21 November 2001, AJA, HM. Paratypes: NMSA/Olig.03529, 2 cl + 3 with developing tubercula pubertatis + 3 juv, collected together

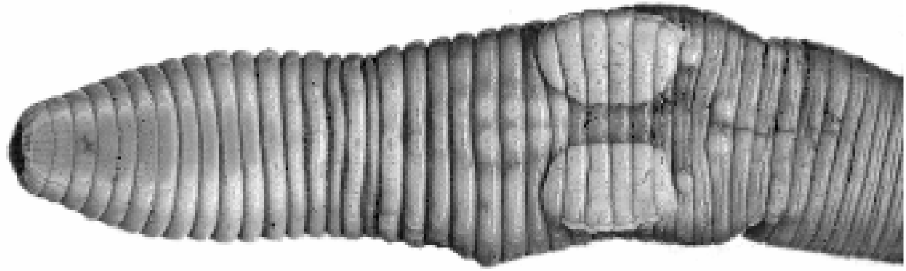


Fig. 18. *Tritogenia tetrata* sp. n., holotype, anterior part of the body ventrally, showing secondary annulation of segments 4–10, tubercula pubertatis, and papillae.

with holotype. Other material: NMSA/Olig.03367 on summit near Nkandla State Forest (28°42'09"S:31°07'28"E) under rock in grassland, 13 March 2001, 1 semi-mature with no spermathecae, BK, B. Church, S. Louw; NMSA/Olig.03366 on summit near Nkandla Forest Reserve (28°42'09"S:31°07'32"E) under rock in grassland, 13 March 2001, 1 well developed clitellate [with abnormally regenerated segments], BK, B. Church, S. Louw; NMSA/Olig.03532 Nkandla Forest Reserve (28°42'44"S:31°08'39"E) at 1204 m, grassland, east-facing slope, under grass burnt 3 years ago, at 30 cm depth, 21 November 2001, 2 cl, AJA, HM [associated with acanthodrilid of the genus *Udeina*, and *Proandricus babanango*]; NMSA/Olig.03427 Nkandla Forest Reserve (28°44'31"S:31°08'54"E) hillside, at the edge of forest, 10 April 2001, 2 juv, AJA, PN.

Description based on holotype and paratypes.

External characters:

General: body cylindrical, compact after preservation. *Colour*: grey in life; preserved yellowish-grey with last 4–5 segments dark brown. *Dimensions*: preserved and contracted holotype 76 mm long, 7 mm wide at 10, 8 at tubercula pubertatis; mature paratypes with no clitellum, 52–66 mm long, 6–7 mm wide at tubercula pubertatis; juveniles 42–52 mm long, 5 mm wide. *Segment number*: holotype 81, paratypes 77–83. *Prostomium*: prolobous, small. *Segmentation*: secondary annulation present on preclitellar segments, observed in holotype and paratypes; 1–3 simple, short, with irregular longitudinal grooves; 4–8 with 2 simple ringlets, similar in size and appearance; 9–10 with 2 ringlets, second shorter than first; 11 and clitellar simple, smooth; postclitellar segments irregularly annulated. *Setae*: minute, closely paired, with irregularities in longitudinal arrangement; on 8–18 distance between pairs of *ab* setae converging, postclitellarly slightly more distanced, in irregular, uneven lines; *cd* pairs in irregular lines on whole body length. *Nephridial pores*: not observed. *Female pores*: paired, minute, between *aa* setae in 14, close to 13/14 intersegmental furrow. *Male pores*: probably in intersegmental furrow 19/20 on tubercula pubertatis, where there are paired small depressions. *Spermathecal pores*: obvious in intersegmental furrows 12/13 13/14 14/15 15/16, slightly above *cd* setae.

Clitellar region (Fig.18): *Clitellum*: saddle-shaped, pale or brownish, segmented; on holotype 15–26, on paratypes 14, 15–25, 26; on holotype clearly bordered anteriorly and posteriorly, on paratypes with faint borders; on first two anterior clitellar segments extending only dorsally, not reaching *cd* setae; on following segments, ventral borders extend slightly below *cd* setal lines, touching dorsal rims of tubercula pubertatis. *Tubercula pubertatis*: oblong, broad pads on 1/n17,18–23; commencing abruptly, terminating at intersegmental furrow 23/24. Dorsally commence below *cd* setal lines, ventrally terminate along *a* setae; clearly segmented, rimmed around, dorsally with soft fold separating pads from clitellum. *Papillae*: paired or single, on 11–19, 26; small swellings in *ab* and *cd* setal lines.

Internal characters:

Septa: 4/5–8/9 thickened very much, similar in size and appearance, 9/10 aborted; other septa thin. *Gizzard*: large, muscular, in 6–7; commencing at septum 5/6, extends through whole of 6 and 7; septum 6/7 attached to its middle. *Calciferous glands*: one pair stalked, dorsolateral, muscular, in 9–10; each gland connected to oesophagus by soft stalk in 9. *Intestine*: commences in 13, with some anterior part reaching posterior part of segment 12. *Typhlosole*: in holotype commences abruptly in 20 as V-shaped, sharply enlarging in following segments becoming large U-shaped fold; terminates in area of 49. *Dorsal blood vessel*: double in 4–11; double when crossing septa 4/5–10/11; simple in 12 and following segments. *Paired dorsoventral commissural vessels*: 4–8 thin, gradually enlarging; 9–11 thick, moniliform. *Nephridia*: two pairs per segment; ventral pairs close to median bodyline, lateral pairs dorsolaterally; in preclitellar segments much larger than posteriorly; in posterior segments small, coiled. *Spermiductal funnels*: holandric arrangement; two pairs, similar in size and appearance, iridescent, in 10 and 11 respectively; each pair enclosed in sac closely connected with seminal vesicles. *Seminal vesicles*: two pairs of sacs linked with testis sacs in 10 and 11 respectively. *Spermathecae*: tiny ampullae in 12–15, multiple at each side. *Ovaries*: paired, in 13, large, funnel-like, close to median line near septa 13/14. *Genital glands*: in 15–18 paired, small, flat; in 26 paired, large, oval.

Biological notes: Although approximately 85% of the Nkandla Forest Reserve, protected by KZN Wildlife, is covered by forest, the species was found between the roots of various short grasses which cover the margins of the forest verges. The soils in this grassland are shallow but there are some fairly deep watered patches. The grasses are regularly burned to provide grazing for cattle

Distribution: The species is known only from the protected area of the Nkandla Forest Reserve and its close vicinity (Fig. 14).

Discussion: *T. tetrata* is unique in the genus for having spermathecae in four segments, and the spermathecal pores in intersegmental furrows 12/13–15/16. This remarkable species cannot be located in any of the species-groups established by Plisko (1997), and the new species-group is proposed to accommodate the species with four rows of spermathecae. The irregular arrangement of setae observed in *tetrata* resembles those irregularities noted in *annetteae* and *ataxia* of the *sulcata* species-group.

The *zuluensis*-species group

Characterised by multiple spermathecal pores in more than four intersegmental furrows, comprises species: *crassa* Michaelsen, 1918, *melmothana* (Michaelsen, 1928) and *zuluensis* (Beddard, 1907).

T. crassa and *melmothana* are known only from their type localities; *zuluensis* has also been collected from the vicinity of its type locality (Plisko 1992). Species occurrence is shown in Fig. 14. No new material of this group was studied.

NOTES ON THE FAUNA OF MICROCHAETIDAE IN KWAZULU-NATAL

Although microchaetids are usually found in conditions generally suitable for other megadrile earthworms, most of the species prefer natural undisturbed habitats. Their limited ability to disperse naturally has resulted in speciation, which has produced many endemics found within restricted ecological habitats. All 137 species are endemic to the southern part of the African continent, and are assigned to four genera: *Microchaetus* (49), *Proandricus* (51), *Tritogenia* (36), and *Michalakus* (1).

Microchaetus has the widest distribution, as shown by Plisko (1998). Species are known the Northern Cape, Western Cape, Eastern Cape, KZN, Mpumalanga, and Limpopo provinces of South Africa, as well as from neighbouring Swaziland. The genus occurs in a variety of biotopes. Only 15 species have been recorded from KZN, of which 12 are endemic to the province, and exist in small areas of primary grassland, indigenous forest and woodlands. *Microchaetus* species known from KZN are listed in Table 1. Only three species extend their occurrence outside this province. *M. pondoanus* is known from a small area bordering the two provinces of KZN and Eastern Cape. Species *natalensis* and *parvus* occur at numerous sites in KZN and range beyond this province to the north. *M. natalensis* is known from KZN, Mpumalanga and Limpopo provinces, and from Swaziland. *M. parvus* has been collected in natural sites, as well as in cultivated areas into which it has been introduced, and occurs in KZN and Mpumalanga provinces.

Michalakus is monotypic and is known only from two sites in the KZN Midlands and is endemic to this province.

Proandricus is found in South Africa and Lesotho, ranging through the south-eastern part of the Eastern Cape, through KZN, and terminating its distribution in northern Mpumalanga. Of the 51 known species, 30 occur in KZN with 28 being endemic to the region (Table 2). Species with a wider distribution, occurring in KZN and in the other provinces, include *setosus* and *modestus*. *P. setosus* is known from KZN and Mpumalanga. *P. modestus* has been collected at numerous localities in North West, Free State, Eastern Cape, KZN and Mpumalanga provinces. It is known mainly from agricultural fields, but also from less disturbed biotopes on the banks of rivers and road verges. Its wide distribution may result from an ability to adapt to environmental disturbance.

The other known proandric species (except *sirgelli*, known from Western Cape) occur in the south-eastern part of Eastern Cape, often ranging to the southern border of KZN, or occur at high altitudes in the Drakensberg mountain range and in Lesotho. Most of the *Proandricus* species are confined to natural biotopes. They occur in small areas with undisturbed soil, in indigenous grassland and pastures, but may occur also in indigenous forest and bushveld habitats, or open savannah.

Tritogenia is endemic to the north-eastern parts of South Africa. Of the 36 species, 27 are endemic to KZN (Table 3). They occur in primary grasslands, endemic forests with patches of grasses, and undisturbed sites in protected areas. Sporadically they may be found in freshly cultivated gardens (i.e. *zuluensis, curta*), or near roads and on the banks of rivers, but always with clear preference for natural habitats. Three species, *ataxia, herbana* and *liversagei*, occur in northern KZN and range into Mpumalanga. Four species not recorded from KZN—*kruegeri*, *palusicola*, *silvicola*, and *turneri*—are known only from Mpumalanga and Limpopo provinces. The last two species occur as far north as the Soutpansberg mountain range. Only *grisea* has a wider distribution, being recorded from Free State, North West, Mpumalanga and Gauteng provinces. Although the distribution of *benhami* is not known, the species may eventually be found to occur in KZN. *Tritogenia* species, like other microchaetids, prefer natural habitats, and their distribution is usually confined to small areas.

The knowledge of microchaetid distribution in South Africa is incomplete. KZN province is the best researched, and probably has the best known microchaetid fauna. Recently obtained data provide more information on general microchaetid biodiversity and species distribution, throwing new light on generic ranges throughout the country. *Proandricus* species occur in the eastern parts of South Africa, with more than half of the species being endemic to KZN. *Microchaetus* with its widest distribution in Southern Africa may be made up of several distinct lineages. It is of distinct interest that a relatively small percentage of species occurs in KZN. *Tritogenia*, the other holandric genus, is endemic to the north-eastern parts of the country, with the majority of species living in KZN. During many years of collecting in other parts of the country, no *Tritogenia* species were found south of this province, though the presence of *Tritogenia* was positively established north of KZN.

This study demonstrates that KZN has the greatest variety of microchaetid species, with nearly 57% of the described species, although additional species undoubtedly await discovery elsewhere. Further surveys are required in areas not yet investigated, and should be conducted during the periods when earthworms are most active. Present knowledge of microchaetid distribution reveals extensive regional diversification, related to ecological and possibly climatic conditions, and linked to palaeo-geological transformation of this sub-region of Africa.

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